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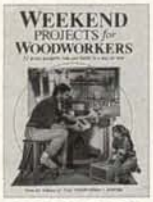

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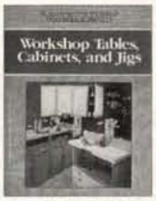

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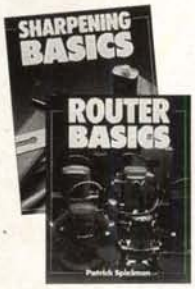

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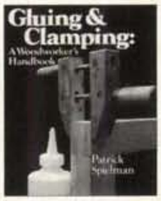

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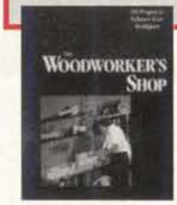

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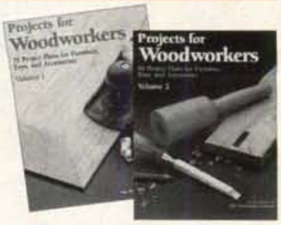

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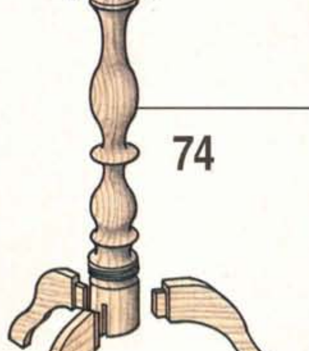
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1993
Popular Woodworking
Readers' Choice Awards

On the Cover

Dick Dorn, Industrial Arts instructor at Oelwein Community Senior High School in Oelwein, Iowa, demonstrates his twin spindle sanding attachment for the drill press. Dick comes up with all kinds of great ideas for jigs and shop devices in his school shop; this one is made from parts from an old belt sander. He tells how you can make one—from any used belt sander—in his article on page 62.

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Clear Cuts

When is it OK to "borrow" a design idea? This is a tough question to try to answer authoritatively, but I think we all have some basic sense about it. Most of us know right from wrong.

If you're making a piece for yourself, or as a gift for someone, I think you should feel free to copy any existing design. In fact, that's often the best way to end up with a piece that looks right and functions properly. There's no reason to go back to the drawing board and redefine "the table" every time you need to make one. There are plenty of classic designs for tables that you can draw upon.

The question becomes a little cloudier when you consider building something for sale. At *Popular Woodworking* we encourage you to use our designs however you like. If you find that one of our projects sells well for you at craft shows or through other marketing means, go for it. Sell as many as you like. But what about the designs of other woodworkers? What if you're at a craft show and you see a good idea; would you be wrong to copy it and sell it yourself? I think so. You're entering into competition with someone using their own idea. The courts would agree—at least they did recently when furnituremaker Thomas Moser sued to prevent people from selling reproductions of his furniture.

I think the question of right and wrong becomes very clear when you're talking about selling the design itself and not just a piece made from the design. I'd be rather upset to learn that someone took a project design from the pages of *PW* and tried to sell the idea to another magazine. Chances are the Editor of that other magazine would be unhappy about it, too. We like to publish original material, not warmed–over stuff that has already appeared in the competition.

A similar situation came up concerning the winner of our last Scrapwood Challenge. In *PW*#69 we awarded the Grand Prize—a 2¼ HP plunge router—to a Mr. Dennis E. Seibert of Mechanicsburg, Pennsylvania for "his" design of a piggy bank using 2 X12 scrap. The whole point of the Scrapwood Challenge is to put readers' design skills to the test, but Mr. Seibert won the contest with a design stolen from the pages of a book called *Making Wood Banks* by Harvey E. Helm (Sterling Publishing Co., Inc.). Mr. Helm contacted me and pointed out that Siebert's design was virtually unchanged from the plans in his book except that he added a tail; the truth is, though, that I added a tail to the plans as we were preparing them for the issue; Mr. Seibert didn't change a thing.

On another subject... This will be my last issue as Editor of *Popular Woodworking*. I've had the pleasure of doing this job since Issue #28, and it's been a lot of fun. Our Shop Manager, Rob Cook, will be stepping into my shoes, and I feel confident that he will continue to bring you fun, challenging project ideas and helpful woodworking information in the years to come. I'm not really going anywhere. I'll be serving as Editorial Director here at EGW Publishing, supervising the production of all our magazines and the development of new ones, and I'll look over Rob's shoulder from time to time to make sure he doesn't change things too drastically. I also plan to spend some time down in our shop, making projects that will appear in future issues of *PW*. So until we meet again, keep making sawdust and thanks for reading.

David M. Camp

Letters

We welcome your comments, pro or con, about articles we publish. Send your letters to: Editor, *Popular Woodworking*, 1041 Shary Circle, Concord, CA 94518. Letters may be edited for publication.

Rocking Horse Sound Effects

I was looking for a rocking horse for a toddler. I built Little Jeffrey's Rocking Horse last weekend. It was a fun project and just the right size. I added something others might be interested in—audio. I cut a slot 2½" X 5" in the center body piece (B) and added an iron washer about 2" in diameter and ½" thick. As it rocks, the washer hits the ends of the slot with a sound resembling hoof beats. My new grandson, Blake, should be old enough to ride his horse by Christmas.

Don Rickard
Russellville, Arkansas

Hard to Find Spice Jars

In your March, 1992 issue you have the Lazy Susan Spice Rack project. I would like to build some of these, but have not been able to locate any of the jars in grocery stores or other outlets. Could you suggest a resource for this item?

Stanley F. Hladik
Traer, Iowa

Dan Labzentis replies: The jars I used were purchased at my local kitchen supply store for about $1 each. Another possible source is Wilton Enterprises, 2240 W. 75th Street, Woodbridge, IL 60515. Telephone 708-963-7100. The description and part number is Spice Rack Spare Parts Set, #2557-1020. The set contains four spice jars with white caps and lids.

Bud Vase Inserts

In your issue #67, July, 1992 I noticed a letter from Paul Hyde of Corvalis, Oregon who was looking for a supply of bud vase inserts. My local florist has plastic inserts with caps at a very reasonable price.

Bob Keniston
Bethel, Maine

Too Hot to Woodwork

I really liked Bob Hlavacek's Southwestern Skull Wall Plaque. It's quite realistic looking, and it will be fun to try my hand at when I can work outside again this fall. At 105°F, it's too hot to work—even under a patio cover.

Also, after reading Jeff Greef's article on the Knickknack Shelf, an old idea came back to mind. The round–ended holes are 9/16" according to the plans. When the sides are tacked together and the saw layout is made, a good bit of time can be saved if the drill press comes into play with a 1/2" brad–point drill bit and each of these curves cut out. It's also easier to swing the jig saw around the tight curves. The sanding drum can still be used to clean up the cut.

He also mentioned about having stock planed down to proper size. Another idea that comes to mind is to use a flat cutter bit on a moulding head on the table saw. By taking several passes, the planing can be done quite easily. If the work piece is cut a little wider than needed, the extra stock acts as parallel runners to keep the cuts uniform. After planing, cut the runners off.

Obviously, a planer is a great machine to have, but this same job can be done with a jointer. If the stock is 8" wide a 4" jointer can be used by first planing one face, then turning the piece end for end and planing the other half.

Another piece of equipment often overlooked is the rotary planer that fits on the drill press or the radial arm saw. This non–kicking planer does an excellent job and costs very little.

Don Kinnaman
Phoenix, AZ

Why Work Wood?

In reading your magazine I have to wonder why some people get involved in some projects. Why go to all the work and expense of building a chair or table when you can buy one at a rummage sale or second–hand store?

Also, I find it hard to believe that a child would choose a wooden toy over a finely built, meticulously crafted plastic or metal one. "Now play with your wooden horse or grandpa's feelings will be hurt." Some people probably resent having these homemade gifts forced on them.

I think it's okay to build some things such as corner cabinets, bird feeders and bird houses. But here I have another criticism. You're getting tired of me, aren't you?

In the birdhouse plans in your magazine and others I don't see any provisions made for cleaning them. I build birdhouses, but I have one side fastened in with storm window toggles so I can climb up, take the side off and pull the old nest out. This is done in autumn so the house will be ready for spring nesting.

Donald Brooks
Menasha, WI

The birdhouse cleaning suggestion is a great one, but I'm not sure everyone would agree with your other criticisms. It's true that you can buy a chair or table at a second–hand store, but that's not woodworking. For many of us, the real pleasure is in the making—the having afterwards is just icing on the cake. I guess what I'm saying is that it's the process, not necessarily the product that keeps me coming back for more. If anybody else out there has an opinion on why woodworkers would rather build than buy, we'd sure like to hear it. And no, Don, we're not getting tired of your criticisms—keep 'em coming. And thanks for buying our magazine.

Editor

Free Advertising

In your September, 1992 issue #68) is a letter from Gary Branstetter of Hepler, Kansas. He enclosed a photo of some of his stuff and complains that he can't sell his work and it just sits in his yard.

The work looked to be creative enough to possibly interest his local news paper or possibly one of a larger city nearby. He should take the photo to a feature writer and ask if they would be interested in a little human interest story, and show them the photo. You would be surprised at the responses he will get and it won't cost him anything to advertise his work this way.

From the photo he sent PW, it appears that he has at least an inkling of creative talent. He should not let that go to waste.

John Bridges
Bivins, Texas

Ready To Carve?

Howdy! I've enjoyed reading PW and building your projects. But ever since a bad back sidelined me, I haven't been allowed to run my machines. I *still can* carve, however, though I haven't seen much in the way of carving projects since Bill McMaster, your carving editor, passed away. Do you plan on resuming carving?

Elmer Doohan
Chicago, Illinois

We sure do—just check out "Carve A Bear" by Jack Ekstrom on page 28. Our new regular carving column, "The Mallet," starts with this issue, and Jack will edit it.

Editor

Corrections

We sure dislike it as much as you when we make errors. But thanks to you observant readers, we're able to set the record straight.

Howard Gabriel of Hershey, PA writes to tell us he's building our rolltop desk (issue #68, The Roll Top Desk, Part 2) and noticed errors in the Cutting Lists on page 87. Here are the corrections: for piece TA, the length should be 25"; for piece TS, the width should be 3/4", and for piece TDA, the width should be 3 3/4" and the length 8 1/8".

Little Jeffrey's Rocking Horse in issue #69 also had an error in the Cutting List on page 35. The footrest dowel is only 12" long—the 32" dowel is for the winged version!

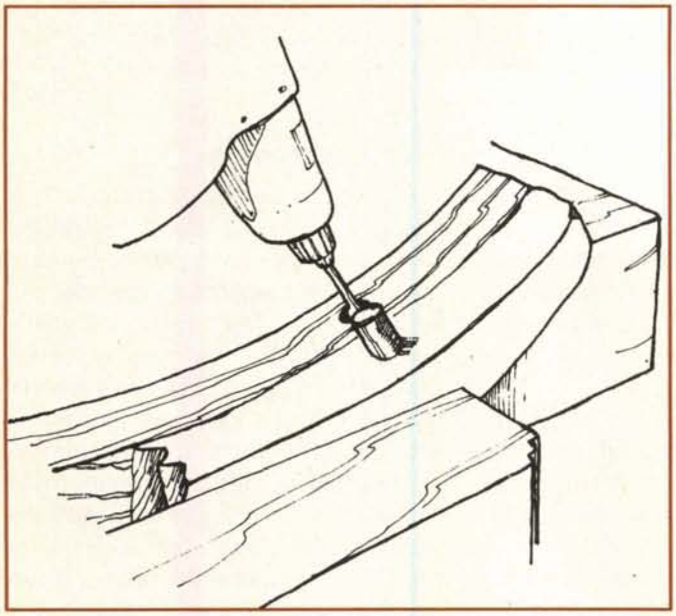
Our apologies—and keep letting us know when we slip up!

Tricks of the Trade

Tricks of the Trade shares readers' tips for making woodworking tasks easier and safer. Send yours to Tricks of the Trade, c/o Popular Woodworking, 1041 Shary Circle, Concord, CA 94518. We pay $25 for each trick we publish.

Dowel Alignment Aid

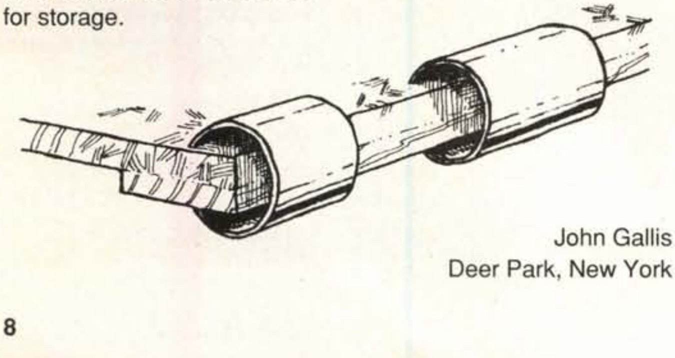
I needed to replace the rocker on an old chair when I discovered that one of the holes was drilled at a compound angle and not perpendicular to the surface. I clamped the old and new rockers in my bench vise and inserted a small length of dowel in the hole of the old piece. I then used the dowel as a sight to align the drill bit.



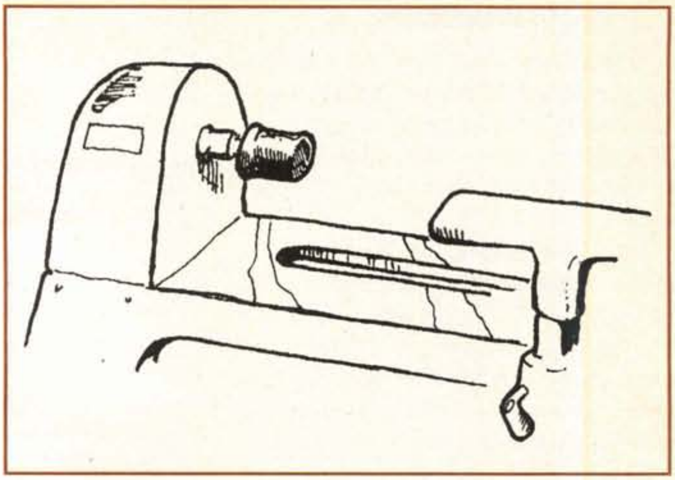
William Nichols
Ravenna, Ohio

PVC Clamps

If I'm gluing up two long strips of wood, I use PVC clamps. Cut some 5" diameter white PVC pipe into 4" lengths—longer pieces will have more clamping pressure. Next, remove a 1" wide strip with a jig saw or hand saw and file the rough edges. It's easy to make a lot of clamps, so stack them on a long piece of closet rod for storage.



John Gallis
Deer Park, New York



Lathe Center Protectors

After my woodturning lathe centers received several damaging blows, I decided it was time for a little prevention. Now, when my lathe is not in use, I press a rubber tip from a walking–cane over each of the centers. If the drive center accidently lands on the floor when I knock it loose, it won't be damaged. Likewise, if you try to catch it as you knock it loose, you won't get stuck in the palm of your hand with the point.

Howard E. Moody
Upper Jay, New York

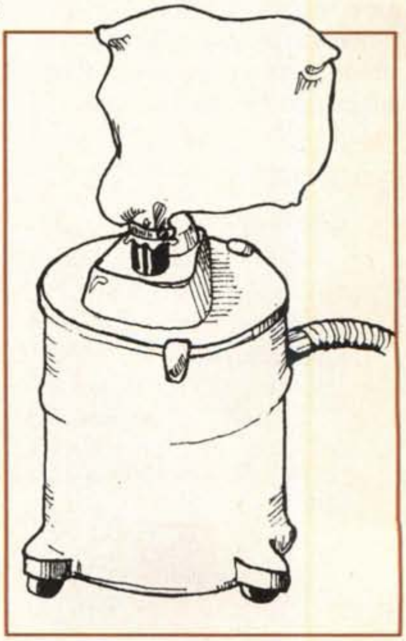
Dust Trap for Your Shop Vacuum

When sanding with very fine paper, the small particles have a way of getting through the filter on my vacuum and coating the shop with a fine layer of dust.

I tried wrapping an old pillowcase around the filter inside the vacuum, but all it did was clog up with dust and needed to be shaken out continually.

I solved the problem by shoving a 6" piece of 2" diameter PVC pipe into the exhaust port on the vacuum. I then used a hose clamp to attach the pillowcase to the pipe. The pillowcase inflates like a balloon and provides a lot more surface area to trap the fine particles. When it fills with dust, it's a snap to empty.

Michael Chilquist
Pittsburgh, PA



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48-9524	700 CFM	1HP,110V	2	4"	80lbs	$299.95	$239.95	$30.00
48-9526	1059CFM	2HP, 220V	2	4"	135lbs.	$399.95	$299.95	$40.00
48-9528	1836CFM	3HP, 220V	3	4"	165lbs.	$649.95	$449.95	$60.00

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- Massive 66" x 8½" table
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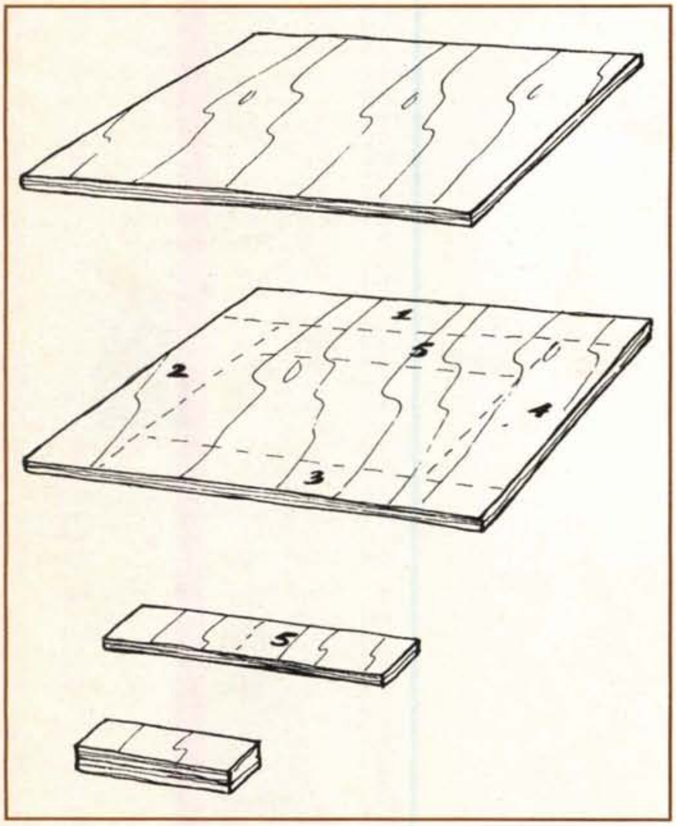
Checking Miter and Fence for Accuracy

On an 18" x 18" plywood panel, cut five 2" strips, rotating the panel a quarter turn after each cut. The fifth strip comes off the same side as the first. Cut the strip in half and stack the two pieces—both ends of this strip must be the same width. If there's an error, it's been multiplied four times.

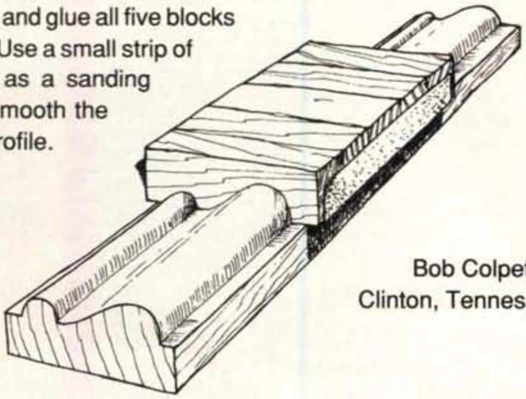
Garmon Coats
Weatherford, Texas



Sanding Mouldings

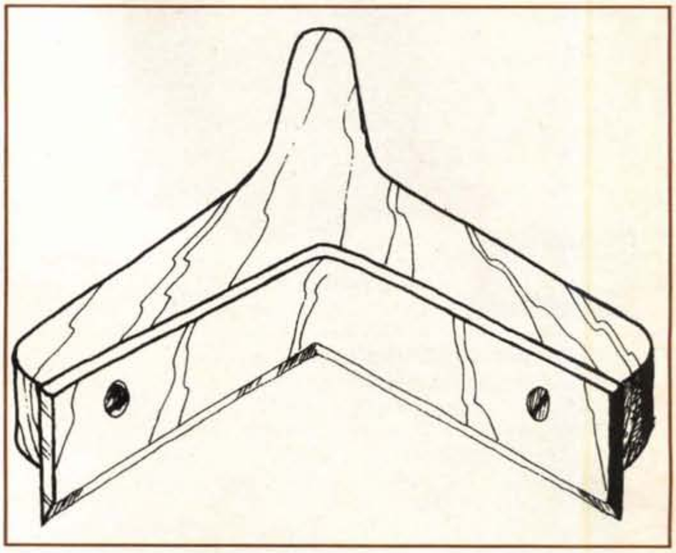
Confronted with several feet of moulding to sand, I made a reverse moulding sanding block to ease the job. Trace the profile of the moulding onto five ¾" x ¾" x 2 ¾" pine blocks. Carefully cut out the profiles on the band saw; then align and glue all five blocks together. Use a small strip of moulding as a sanding block to smooth the reverse profile.

Bob Colpetzer
Clinton, Tennessee



Shop Made Corner Cutter

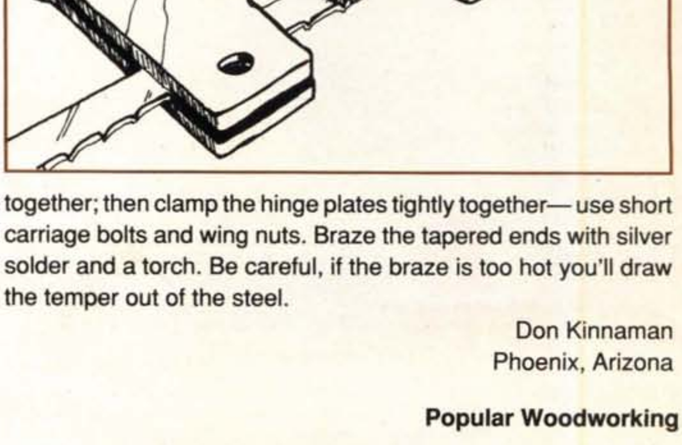
If you're not experienced with a butt chisel, and don't want to spend the money on one from a catalog, you might want to make one. Use a 2" corner iron and sharpen the bottom edges as shown. Clamp the iron in your vise and dress the edges with a file. A hand grinder can also be used to sharpen the edges. Attach a wooden handle and you're ready to go. You may have to hone or retouch the edges from time to time, but it's well worth it.



Don Kinnaman
Phoenix, Arizona

Band Saw Brazing Jig

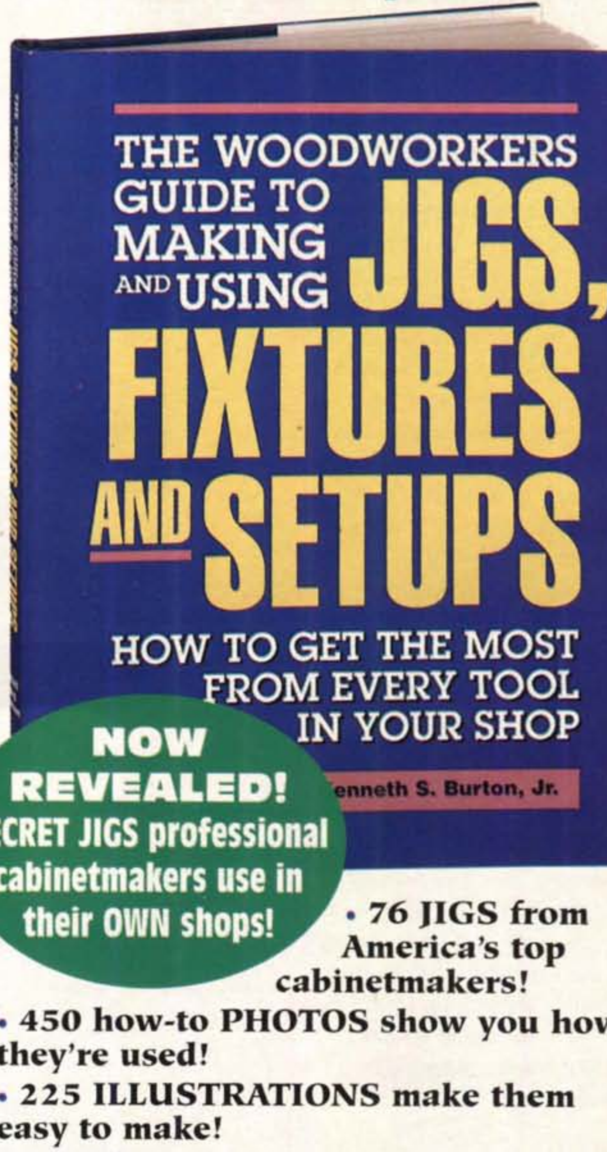
Cut away the center from a large 6" door hinge as shown. Scribe a reference line on the face of one of the leaves so you can align the two blade ends. Taper the ends where they come together; then clamp the hinge plates tightly together— use short carriage bolts and wing nuts. Braze the tapered ends with silver solder and a torch. Be careful, if the braze is too hot you'll draw the temper out of the steel.



Don Kinnaman
Phoenix, Arizona

The one BIG book that answers the question:

"What's the BEST way to do the job with the tools I have in my shop?"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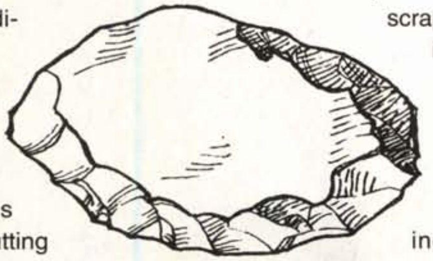
Tried and True

by John Watson

The Scraper

A Tool from the Dawn of History

For woodworkers who don't own a scraper the term is likely to conjure up an image of the simplest tool imaginable: a flat rectangle of steel with no handle, no apparent top or bottom; a featureless piece of metal. Few would guess that in addition to being one of the oldest tools known to mankind it is also one of the most efficient.



Frequently found alongside other stones used for pounding and cutting (the proto-hammers, saws, and knives), stone scrapers were the most commonly used tools by the cave-dwelling people of the Stone Age. While it is true that the common scraper is a simple rectangle of steel, it is a useful and basic tool that has since developed into countless varieties, with designs for many special purposes, such as wall scrapers, cabinet scrapers, oval scrapers, swan neck scrapers, moulding scrapers etc... The list could be continued, but the message is clear: this is truly a tried and true tool.

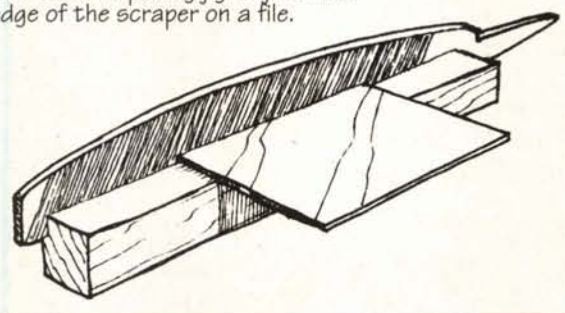
The Secret Hook

For such an apparently simple tool its use is often surprisingly little understood. Early scrapers—and indeed many contemporary scrapers used for purposes other than woodworking—usually consist of a blade finished in a simple sharp edge, beveled or square. But those scrapers used for fine woodworking (cabinet scrapers) have the edge of the blade formed into a small hook. The hook is made by turning back the edge a very small amount; the result being instead of scraping—which may be thought of as a trailing action that mostly produces dust and small fragments of the material being scraped—the cabinet scraper actually cuts in a manner very similar to a plane. And, if well conditioned, it produces a shaving. For this reason, it is more properly referred to as a turned-edge scraper.

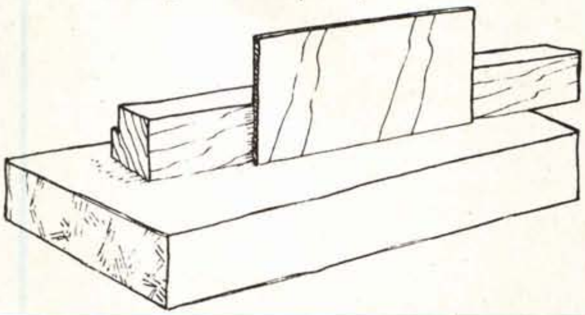
The turned edge is only part of the secret. It's one thing to be told how a tool works but quite another to know how to use it, and, in this case especially, how to fit it for use and produce the almost unnoticeable hook.

A lot of nonsense has been written on the correct angle at which the edge of scraper should be turned. Unless you use some form of guide, such as that described below, the art of sharpening a scraper is an indeterminate skill. Even the best steel will become worn with use—sometimes from the very first stroke. The angle of the edge is constantly changing. When you gain a little experience actually using a properly sharpened scraper you will notice that the best shavings are produced by adjusting the angle at which the scraper is held to the wood. This angle depends as much on the species and condition of the wood as on the original angle turned on the scraper. That angle depends partly on the quality of the steel.

Use the sharpening jig to joint the edge of the scraper on a file.



Hold the scraper against the sharpening jig to hone the edge on a sharpening stone.



Nowadays, scrapers are often packaged with instructions regarding their use and care, but this is a relatively new phenomenon. Scrapers used to be shop-made, and much time was devoted to finding just the right piece of metal. English spring steel like the old Disston™ saws engraved with 'London Spring'— and pieces of discarded automobile leaf spring were especially valued. The idea was to find a piece of metal hard enough to hold a very fine edge despite heavy use and at the same time not so hard that it was too brittle to turn a fine edge. In fact, although part of the effect of burnishing—a side effect of proper scraper sharpening—is to realign the molecular structure, or grain, to make it less liable to crumbling. The secret of turning an edge has more to do with exerting the correct pressure upon a perfectly sharpened edge than it does with the inherent quality of the steel being sharpened. The correct pressure, incidentally,

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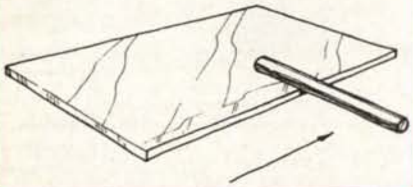
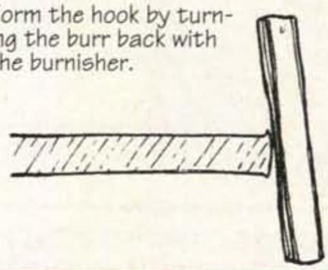
***John Watson** makes furniture and writes about woodworking in Inverness, Calif.*


Burnishing in one direction only helps to the strengthen the edge.

Hold the burnisher flat as it is drawn along the scraper edge.


Form the hook by turning the burr back with the burnisher.

is nowhere near as great as the beginner often believes, but closer to that required to spread butter on bread.

Jointing and Honing

The real secret of obtaining a well-turned edge is the proper preparation of the scraper before the turning is attempted. Just as when sharpening a plane iron or a chisel, both sides of the arris—the junction of the two surfaces that form the edge (in a scraper blade there are three: two faces and the end)—must be mirror smooth and perfectly flat. Anything less than this ideal condition creates a microscopic saw-tooth edge, unable to cut a smooth, continuous shaving. Since the scraper's cutting edge, also referred to as a burr is so small, the least irregularity compromises its ability to cut a smooth shaving from the surface, not to mention the knots and irregular grain that it is commonly used on.

Many books describe how the scraper should be held in a vise and filed, or held flat on the bench and filed. These methods depend on how steady your hand is and how evenly you can operate the file. What is needed is a foolproof jig that enables the file to be used on the scraper's edge without any wavering from flat or square.

Such a jig is astonishingly easy to provide. All you need is a block of wood approximately the same length as the file you intend to use. Cut a shallow rabbet in one side of the block—about 1$^{1}/_{2}$" or so square—so the file may be held firmly against the block with half its width projecting above the block. If you prepare the block perfectly flat, straight, and square (tried and true) you will be able to hold the scraper on the block and rub it against the file, jointing its edge perfectly. Then, hold the scraper against an unrabbetted side of the guide block to keep the scraper's jointed edge perfectly perpendicular to a sharpening stone. This produces the necessary honing to remove all traces of the file and give a mirror smooth edge.

The jointing creates a straight, flat, and square edge. The honing makes the two faces and the edge of the scraper perfectly smooth. Both actions together produce a scraper whose edges can now be turned to produce razor sharp cutters.

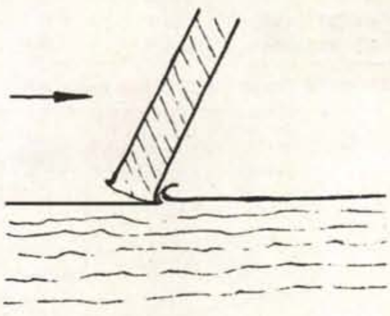
Turning the Edge

Proprietary burnishers have been sold in various designs since well before the beginning of the century, and for want of anything else at hand, they work fine. All that is really needed, however, is a smooth piece of steel—the harder the better.

Two actions are necessary: drawing an edge and turning the hook. The first consists of rubbing the burnisher along the face of the scraper steel, keeping it flat to the surface and applying a little pressure as you move the burnisher along the length. Only a couple of strokes should be necessary to draw out the burr. By holding the smooth burnisher flat against the face of the scraper, the smoothed edge is drawn out a little to form the burr. Do this on both sides of the scraper so that burrs are drawn down from both faces.

If the faces have been honed perfectly smooth, the burnisher kept flat against the face, and even pressure maintained throughout the length of the stroke, a burr will be drawn out. It may be difficult to see but can be felt by drawing the fleshy part of your thumb across it.

The second action is to rub the burnisher along the edge, turning up the burr to form the hook. Since there are two faces and two burrs, you need to do this twice, each time holding the burnisher just a little out of square. Be careful when testing this newly formed edge; if it's sharp enough to cut wood, it will be sharp enough to cut you. It's better to test the edge by using it. If the hook has been properly formed, it will only take a second or two to discover the right angle at which the scraper needs to be pulled or pushed (both actions are legal!) across the surface of the wood to produce a shaving.


The scraper can be used by pushing or pulling. Both actions should produces shavings like a plane.

Once you've experience the thrill of efficient scraping, gnarly wood will never daunt you again—and you will be able to throw away your sandpaper. PW

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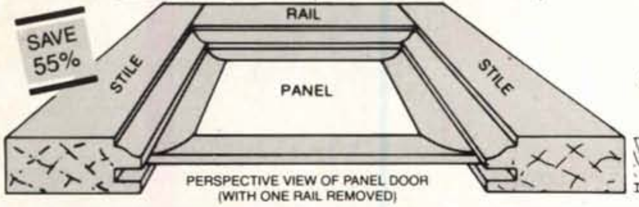
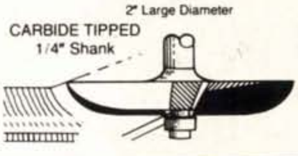


PERSPECTIVE VIEW OF PANEL DOOR (WITH ONE RAIL REMOVED)

RAISED PANEL BIT
SUPPLIED WITH
BALL BEARING



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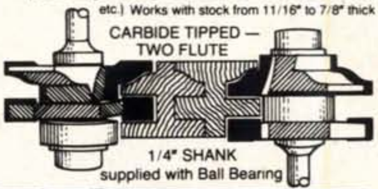

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#601		1/8" **Spiral Cutter**		1/8"	1/2"	1/4"*	$ 9.00
#603	Solid Carbide	1/4" Spiral Cutter		1/4"	3/4"	1/4"	$12.00
#903		1/4" Spiral Cutter		1/4"	3/4"	1/2"*	$12.00
#904		3/8" Spiral Cutter		3/8"	1"	1/2"*	$24.00
#905		1/2" Spiral Cutter	*Proper Adaptor Will Be Supplied	1/2"	1 1/2"	1/2"	$29.00
#530		3/16" **Edge Beading**	3/16" Dia. of Circle		1/2"	1/4"	$15.00
#531		5/16" Edge Beading	5/16" Dia. of Circle		1/2"	1/4"	$15.50
#350		1/8" **Round Over**	1/8" R	3/4"	3/8"	1/4"	$11.00
#351		3/16" Round Over	3/16" R	7/8"	1/2"	1/4"	$11.00
#230		1/4" Round Over	1/4" R	1"	1/2"	1/4"	$12.00
#353		5/16" Round Over	5/16" R	1 1/8"	1/2"	1/4"	$14.00
#209		3/8" Round Over	3/8" R	1 1/4"	5/8"	1/4"	$15.00
#355		1/2" Round Over	1/2" R	1 1/2"	3/4"	1/4"	$17.00
#655		1/2" Round Over	1/2" R	1 1/2"	3/4"	1/2"	$17.00
#656		3/4" Round Over	3/4" R	2"	7/8"	1/2"	$21.00
#199		**Multiform Moulding**	Unlimited Patterns	2 1/4"	2"	1/2"	$40.00
#205		1/4" **Cove**	1/4" R	1"	1/2"	1/4"	$12.00
#206		3/8" Cove	3/8" R	1 1/4"	9/16"	1/4"	$13.00
#207		1/2" Cove	1/2" R	1 1/2"	5/8"	1/4"	$14.00
#643		1/2" Cove	1/2" R	1 1/2"	5/8"	1/2"	$15.00
#208		3/4" Cove	3/4" R	1 7/8"	3/4"	1/2"	$26.00
#231		5/32" **Roman Ogee**	5/32" R	1 1/4"	15/32"	1/4"	$16.00
#232		1/4" Roman Ogee	1/4" R	1 1/2"	3/4"	1/4"	$17.00
#506		1/2" **Pattern**	Flush Trim	1/2"	1"	1/4"	$15.00
#508		3/4" Pattern	Flush Trim	3/4"	1"	1/4"	$17.00
#366		1/8" **Slot Cutter**	3/8" Deep	1 1/4"	1/8"	1/4"	$14.00
#368		1/4" Slot Cutter	3/8" Deep	1 1/4"	1/4"	1/4"	$14.00
#204		3/8" Rabbeting	3/8" Deep	1 1/4"	1/2"	1/4"	$13.00
#670		3/8" Rabbeting	3/8" Deep	1 1/4"	1/2"	1/2"	$14.00

ITEM NO.	BEST CUT BEST PRICE	DESCRIPTION	ANGLE/DEPTH/RADIUS CIRCLE DIAMETER	LARGE DIA.	CUTTING LENGTH	SHANK SIZE	PRICE
#211		3/8" **Core Box**	round nose	3/8"	3/8"	1/4"	$10.00
#212		1/2" Core Box	round nose	1/2"	11/32"	1/4"	$13.00
#418		3/4" Core Box	round nose	3/4"	5/8"	1/4"	$15.00
#213		1" Core Box	round nose	1"	3/4"	1/2"	$17.00
#548		**Lockmitre**		2"	7/8"	1/4"	$32.00
#214		1/4" **Straight**	plunge cutting	1/4"	3/4"	1/4"	$ 6.50
#216		3/8" Straight	plunge cutting	3/8"	1"	1/4"	$ 6.50
#474		1/2" Straight	plunge cutting	1/2"	1"	1/4"	$ 7.00
#219		3/4" Straight	plunge cutting	3/4"	1"	1/4"	$ 9.50
#779		3/4" Straight	plunge cutting	3/4"	1 1/2"	1/2"	$10.00
#462		1/2" **Bull Nose**	1/2" Dia. of Circle		3/4"	1/4"	$16.00
#464		3/4" Bull Nose	3/4" Dia. of Circle		1"	1/4"	$21.00
#764		3/4" Bull Nose	3/4" Dia. of Circle		1"	1/2"	$21.00
#545		**Tongue & Groove**	Straight	1 5/8"	1"	1/4"	$29.00
#845		Tongue & Groove	Straight	1 5/8"	1"	1/2"	$29.00
#546		Tongue & Groove	Wedge	1 13/16"	1"	1/4"	$29.00
#846		Tongue & Groove	Wedge	1 5/8"	1"	1/2"	$29.00
#450		1/8" **Beading**	1/8" R	3/4"	3/8"	1/4"	$11.00
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#503		1/2" Flush	Trimming	1/2"	1"	1/4"	$ 8.50
#221		1/2" Flush	Trimming	1/2"	1 3/16"	1/2"	$ 8.00
#558		**Thumbnail**		1 3/16"	3/8"	1/4"	$18.50
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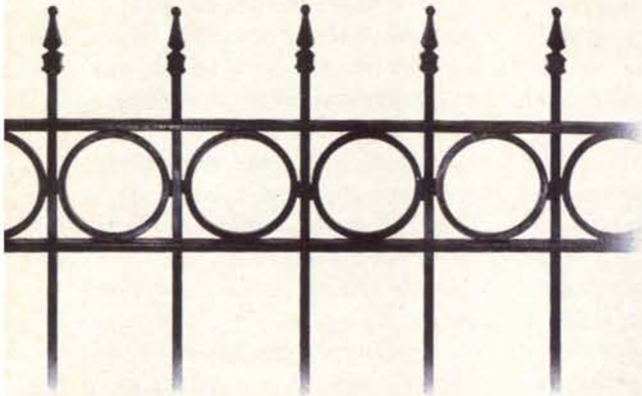

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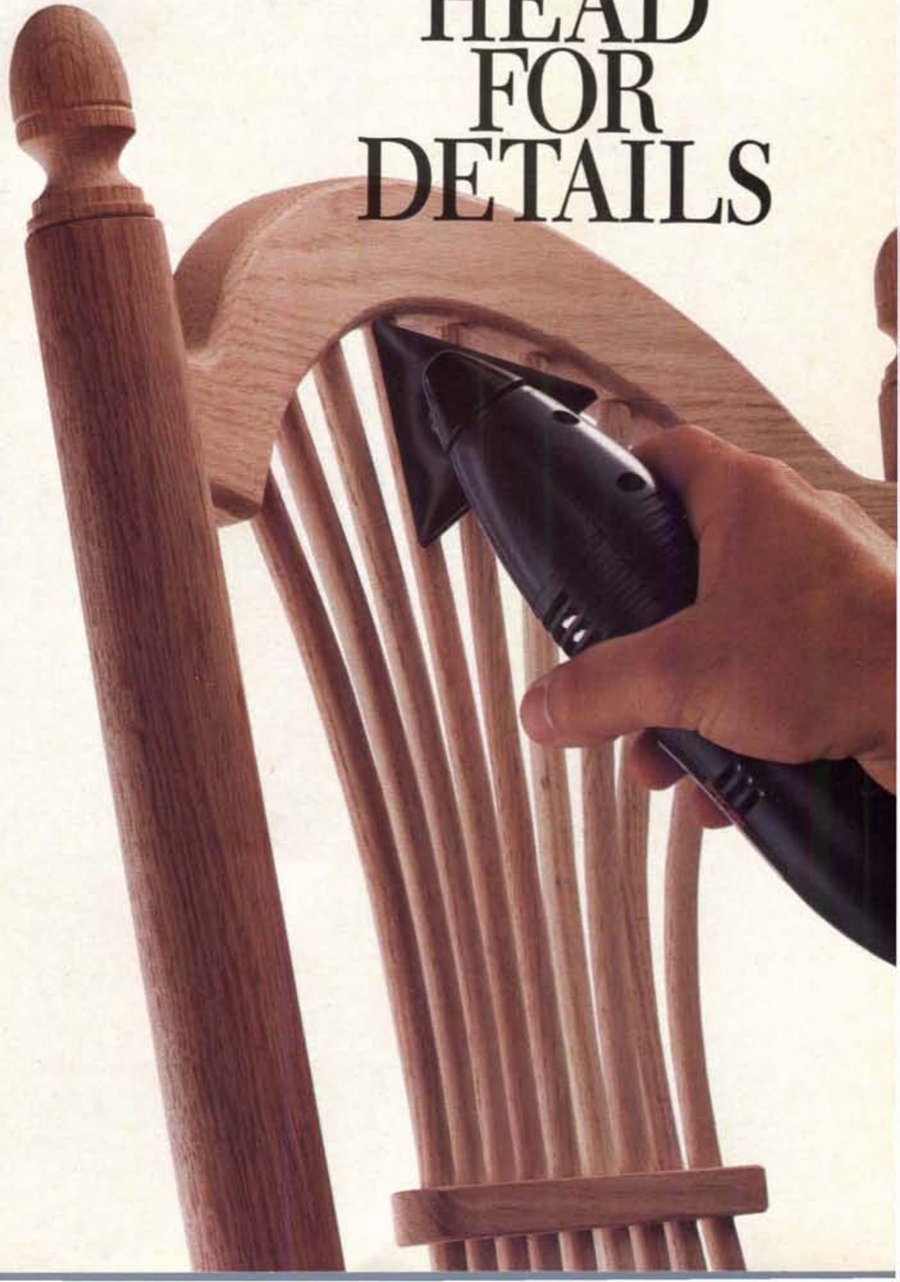

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The Finishing Forum

by Tom Wisshack and Dick Fitch

The Finishing Forum is an ongoing discussion about the art of wood finishing. If you have a question or a problem to solve, we'd like to help. If you have a tip or secret to share, or you recently tried a new product, write to: The Finishing Forum c/o *PW*, 1041 Shary Circle, Concord, CA 94518. Letters may be edited.

Raised Grain on Plywood

I wish to prepare a flat black finish on plywood for a scroll saw project by the most efficient method. Do I wet the unfinished plywood with water to raise the grain, sand and then use a water–based paint? Is it better to spray the plywood with shellac, then follow with enamel spray? Will shellac raise the grain where it needs sanding anyhow? Which method will cut down on the overall sanding time?

Rudi Franke
Indianapolis, IN

You have a number of options for applying a flat black finishing system on plywood. The two I'll mention are time and labor efficient. I don't consider raising the grain with water a practical solution. Wetting the plywood and sanding doesn't guarantee that a water–based paint won't raise the grain again.

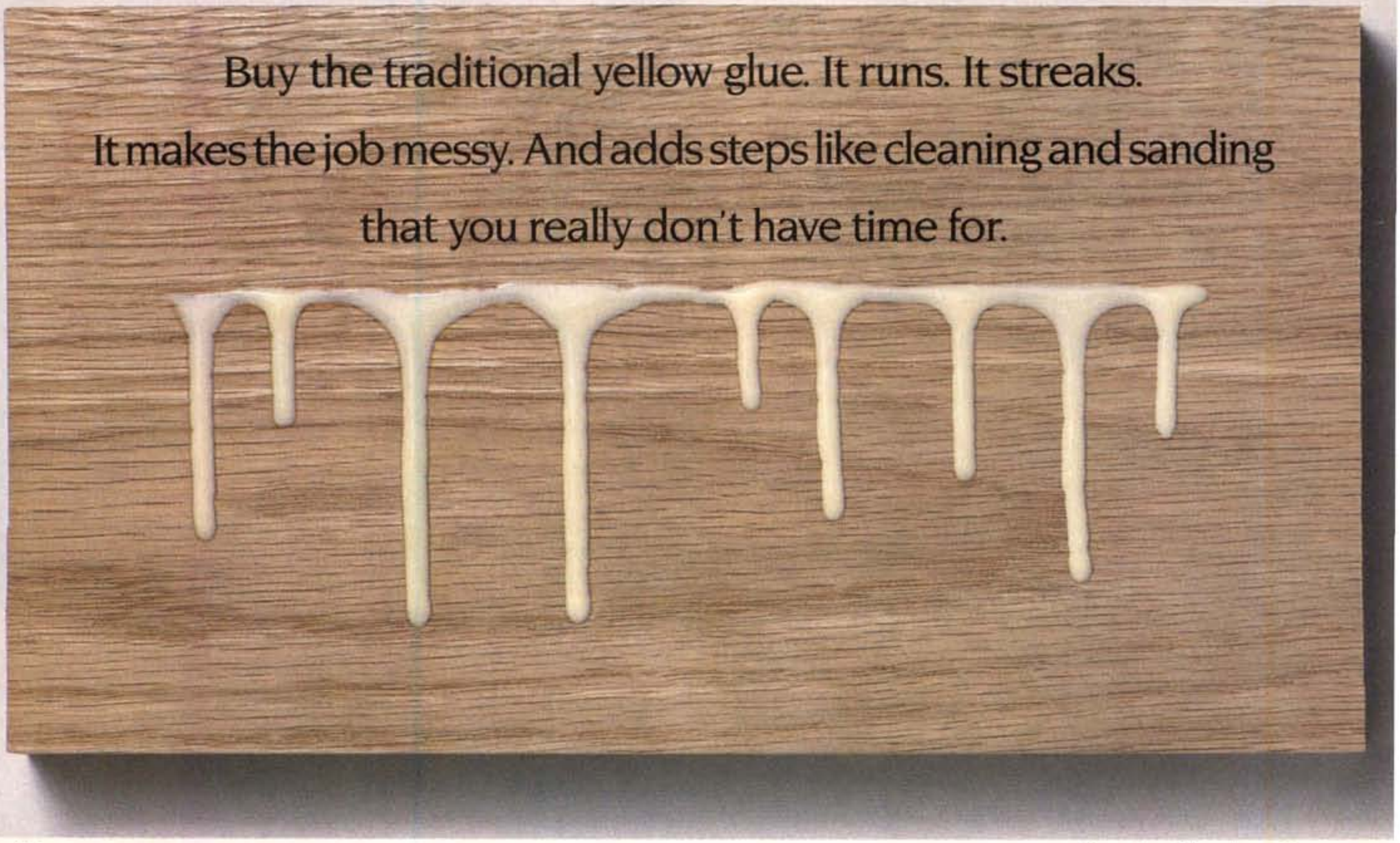
There are two other alternatives. Use spray application if possible. Sand the plywood to the desired smoothness and apply one coat of black NGR (non grain raising) stain—nicks and scratches that may develop later won't expose the lighter colored wood underneath. Next, apply a coat of nitrocellulose or vinyl chloride sealer. Scuff–sand if required. You could use shellac for this coat but it has a greater potential for raising the grain because its solvent (denatured alcohol) can soak up water from the air, especially in a humid environment. Finish with flat black lacquer. The drying time for each application is very fast and the whole system can be applied in one day. Sanding is minimal once the raw plywood is smooth.

For the second method, sand and apply the black NGR stain; then apply a coat of vinyl toluene-based sanding sealer. This sealer has a naphtha–type solvent and will not raise the grain. Scuff–sand if required and finish with flat, black enamel. This system has a longer drying schedule, but is still in the practical range. Sanding is minimal once the plywood is smooth.

There are some precautions you need to consider. Do not use a polyurethane enamel over any sealer that contains zinc or any other stearate.

***Tom Wisshack** makes and restores fine furniture in Galesburg, Illinois.*
***Dick Fitch** is the resident alchemist at The Bartley Collection, Ltd.*

HOW TO GET STUCK WITH WOOD ADHESIVE.


Buy the traditional yellow glue. It runs. It streaks.
It makes the job messy. And adds steps like cleaning and sanding
that you really don't have time for.

The same caution applies for lacquer or other products that contain active solvents over a vinyl toluene sealer. These solvents soften and wrinkle it.

The use of black NGR stain is optional, but I think it's important as insurance against future problems. You can use a black oil penetrating stain in place of the NGR stain, but at the expense of drying time.

Dick Fitch

Boning

I'm putting together a Hawkin 55 caliber rifle kit and would like to finish it by a method called boning. I remember hearing about it when I was a youngster, but I don't know the proper method. The best I remember is that you use a fresh bone and rub it on the wood itself.

Will there be any kind of odor problem with this method? The stock is walnut and has no prior finish.

R. J. Connolly
Mt. Clemens, MI

You're on the right track with your idea of burnishing the gun stock. For the best results, use a horn or a piece of polished agate.

A better approach, though, is to use one of the new Space Age abrasives, such as Micro-Mesh™ (available from C. W. Crossen Co., 706 E. River Dr., Davenport, IA 62803). These abrasives pick up where ordinary sandpaper leaves off, allowing you to achieve a glass-smooth surface before any finish is even applied.

Seal the stock after polishing so the natural oils and any dirt from your hands won't spoil the beautiful wood. I suggest Formby's® tung oil varnish (low gloss), which you can find at your local hardware store. Brush a liberal coat onto the stock and work it into the pores. After a minute or two, wipe off the surplus oil with a soft cloth.

To clean the stock, make a paste of rottenstone abrasive powder and mineral oil and rub it briskly on the stock with a soft cloth; then wipe off any excess. In a few years your gun stock will have a nice patina.

Tom Wisshack

Decal Preservation

I recently purchased a treadle Singer sewing machine. The table was easy to refinish, but the dust cover is a problem. It was heavily varnished by the previous owner and has darkened with age to the point where the Singer logo decal is almost obscured by brown streaks. The decal is in wonderful condition and I really want to preserve it in its original state. How can I remove the newer varnish without harming it?

Faye Lawrence
Santa Cruz, CA

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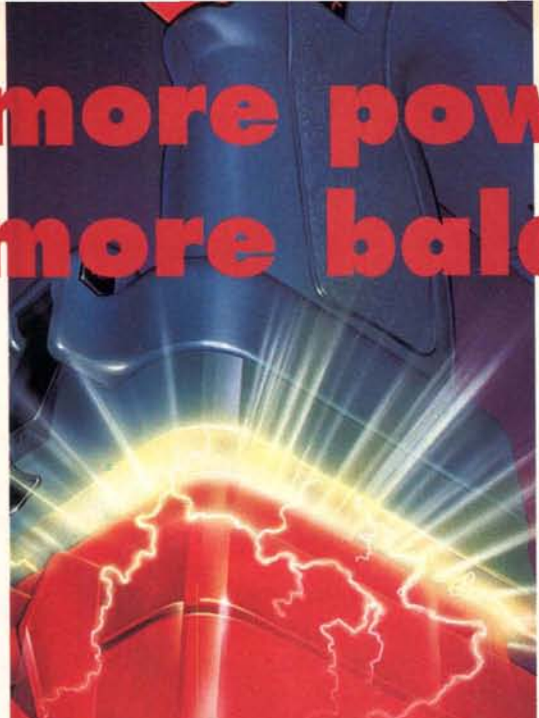

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The one word that best describes how to expose a decal or painted design obscured by layers of discolored varnish is "carefully."

On the outside chance that the varnish coat is shellac, try wiping the spot with denatured ethyl alcohol (shellac solvent). Keep the spot quite wet and wipe with a clean cloth. If the surface gets tacky and the varnish wipes off, you're in luck. Continue to wet and wipe carefully. If the obliterating films turn out to be oleoresins or alkyd varnish, the film has to be removed with solvent one layer at a time using a scalpel and swabs. You'll probably have to leave one very thin film on the logo area to avoid removing the decal. Strange as it may seem, this is standard procedure for restoration work.

Two candidates for the solvent to remove varnish are: An equal mixture of denatured ethyl alcohol and xylene. This combination will remove most old varnish films. It can be checked with mineral spirits if it acts too quickly. Apply the solvent and keep the surface wet until it softens, then carefully remove the top layer with a scalpel and swab. You can stop the solvent penetration by wetting the area with mineral spirits. Wipe the area dry and repeat the process.

In a recent restoration that I am familiar with, 3M's Safest Stripper was used to expose graining that was obliterated by several layers of paint and varnish. The restorers found that this product worked more slowly than conventional strippers and could be used with comparative safety.

Whichever solvent or remover you use, the procedure is the same. It is tedious but, to the best of my knowledge, there is no easy way out.

Dick Fitch

Verdigris Follow–Up

In the May issue "Finishing Forum" (PW #66), John Bunting asked about creating a verdigris finish on a punched copper door panel. I'd like to recommend a product called "Patina Green," which is available in many hardware stores. It's manufactured by Modern Options, Inc., 2325 Third St., Suite 339, San Francisco, CA 94107 (415-252-5580).

The procedure is simple. First clean the copper, brush on Patina Green and let it dry. Two coats or so will turn the panel green; use steel wool to take off a few high spots to give it a worn look. Then give it a coat of clear lacquer.

Bob Pool
Fairfax, CA

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C1009	5/16"	3/4"	2-1/2"	$6.00
C1010	3/8"	3/4"	2-1/2"	$6.00
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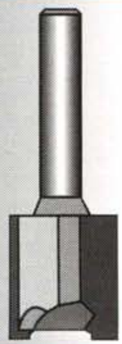

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C1177	1"	1/2"	2"	1/4"	$11.00
C1179	1-1/4"	5/8"	2-1/4"	3/8"	$14.00

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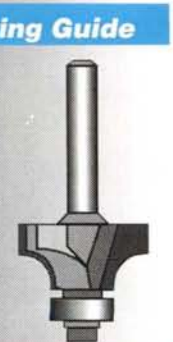
PART	CUTTER DIA. A	CUTTING LENGTH B	OVERALL LENGTH C	RADIUS r	PRICE
C1184	1"	1/2"	2-1/4"	1/4"	$11.00
C1185	1-1/8"	1/2"	2-3/8"	5/16"	$12.00
C1186	1-1/4"	5/8"	2-1/2"	3/8"	$14.00



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C1069	1/2"	1/2"	1-3/4"	14°	$5.00
C1071	3/4"	11/16"	2-1/8"	14°	$7.00

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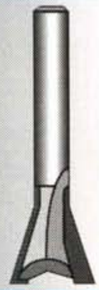
PART	CUTTER DIA. A	CUTTING LENGTH B	OVERALL LENGTH C	ANGLE a	PRICE
C1074	1/2"	1/2"	2-1/4"	14°	$5.00
C1076	3/4"	3/4"	2-1/2"	14°	$8.00



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C1143	1-1/4"	5/8"	2-1/8"	3/8"	$14.00

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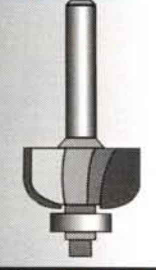

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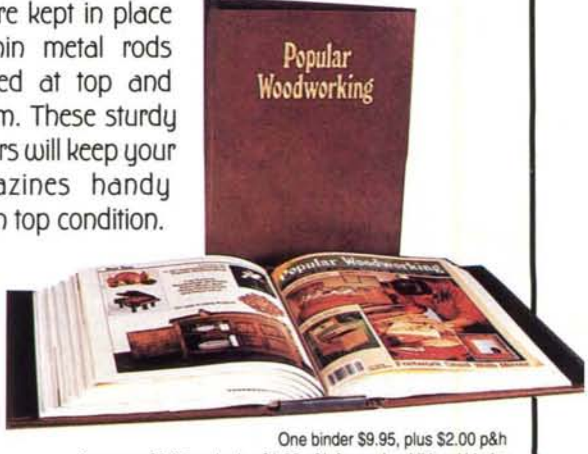

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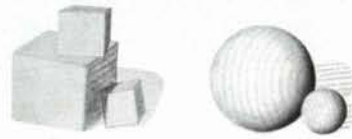

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The Business End

by Ken Sadler

Fine Furniture Builds A Fine Business

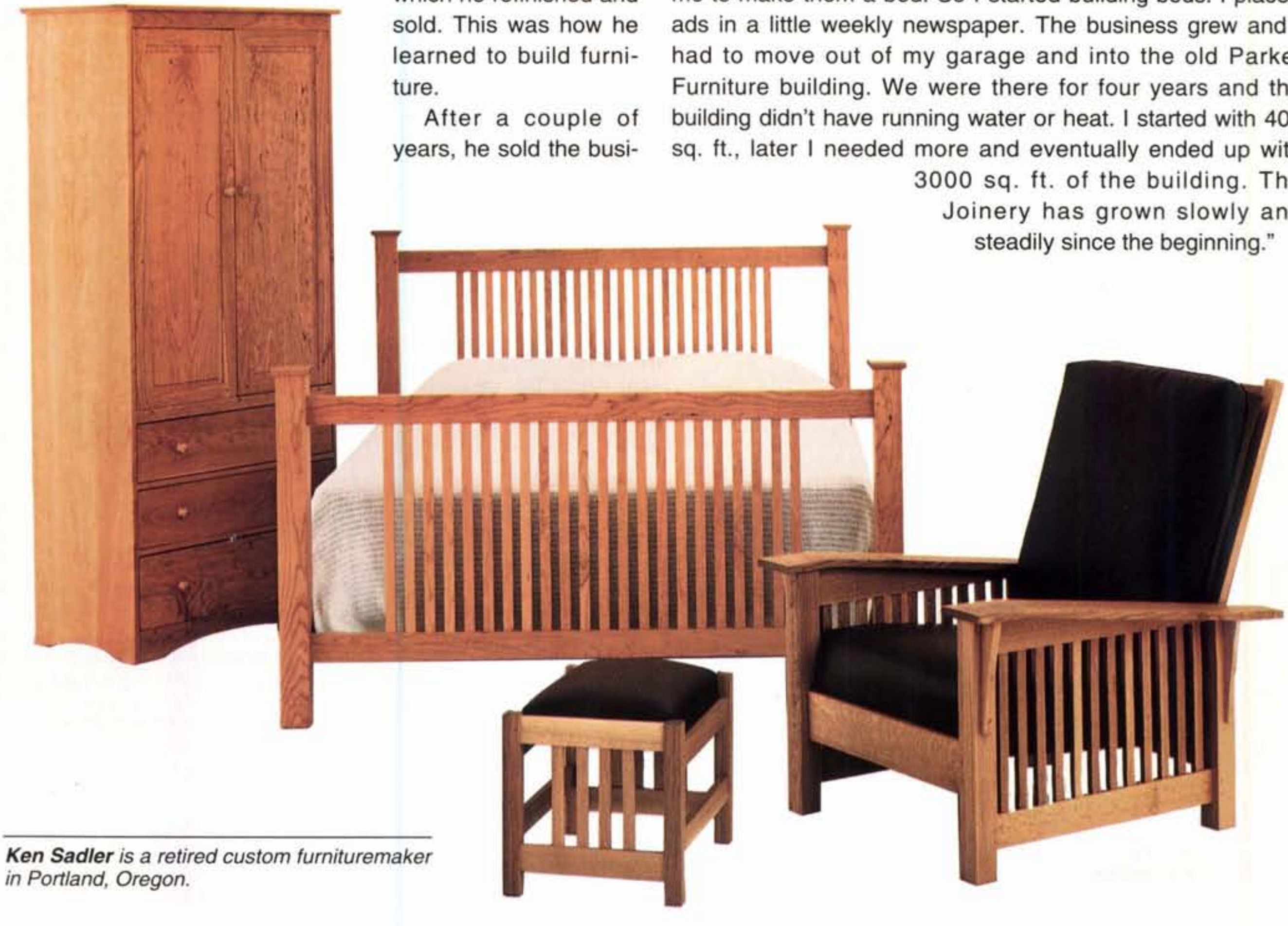
Marc Gaudin loves wood and is dedicated to building fine furniture. He is also a machinery lover. A new Unisaw or a rack of twenty routers is a thing of beauty in his eyes. Marc's greatest pleasure is making furniture, and making money comes second. This is a fine vision if you can make it work, and Marc has. This year his company, The Joinery, will gross well over $350,000.

The Joinery produces a full line of furniture: tables, dressers, beds, coffee tables, end tables, and armoires. Prices range between $650 for a queen–size cherry bed frame to $3000 for a large armoire. This compares favorably with factory–made furniture of lesser quality.

Marc Gaudin was raised on a ranch in Montana and earned his living in woodworking shops during high school and college. After college he decided that Portland, Oregon was more to his liking than Big Sky country, so he moved there. Ten years ago, the recession was at its height and job opportunities were few. Marc took what money he had and bought used furniture which he refinished and sold. This was how he learned to build furniture.

After a couple of years, he sold the business and took an office job, but woodworking was his love and five years ago he came back to it.

"I started the business in my garage. Somebody wanted me to make them a bed. So I started building beds. I placed ads in a little weekly newspaper. The business grew and I had to move out of my garage and into the old Parker Furniture building. We were there for four years and the building didn't have running water or heat. I started with 400 sq. ft., later I needed more and eventually ended up with 3000 sq. ft. of the building. The Joinery has grown slowly and steadily since the beginning."



Ken Sadler *is a retired custom furnituremaker in Portland, Oregon.*

In January of '92, Marc moved his company into a 5000 sq. ft. shop with an upstairs showroom. The new space enables him to organize the shop on a more efficient basis and to move larger runs without jamming up production. He sells his products directly from a customer showroom.

The company's early sales were made through their showroom and furniture stores around the country. Stores carry most of the load. Retail showroom sales have shown a rapid growth in recent years, particularly this last year in their new building. The building's improved location and showroom has much to do with this. Today the sales mix is 75% local retail and 25% through furniture stores. Marc likes this mix because, "When Portland sales are slow or lagging, California will be sending in orders. I like having those accounts. They fill in the dead spots." From an economic standpoint the mix is even better, because store sales carry a 50% discount from list, while sales from the showroom go at full list.

Marc has decided that his business has grown big enough. "This is it, I'm not getting any bigger. I don't want to hire any more people. I'm comfortable where I am." Whether he can stick to this size remains to be seen. It is difficult for him to turn customers away. "In my experience, you either take business when it's offered, or lose customers forever."

"My commitment is to make high–quality solid wood furniture. My market is not for the gallery viewers but for people who buy factory–made furniture from large furniture stores." To implement his plan, Marc went to Seattle and showed photographs of his work to furniture store managers. They liked his work and started to carry his furniture. Now fourteen stores around the country sell his furniture.

"I was able do to this because people in the trade know each other and word of mouth has been my best salesman. I haven't had to promote myself hardly at all."

Marc's designs are simple, easy on the eye and structurally well built. His designs have Shaker and Mission influences. All beds are made to order, but occasionally pieces for inventory are included in a run. The size of a run depends on the number of pieces on order when the run is started. Right now a delivery goes out every ten to twelve weeks.

Success has brought problems, however. "When I first started, I had just a few products and I could just tell the customer, 'I'll make that for you next month,' but now there are so many products. We have a brochure that's mind–boggling. Keeping up on prices is incredible with all the styles and different woods and sizes. In many cases, customers want little changes to the standard models and we can do that, but it's getting tough to keep up. In the future we're going to have to confine our production to a certain set of pieces and tell the customers that we can't make major modifications."

"Shipping out of Portland is another headache. Basically, we wrap everything in cardboard and then put the furniture in specific boxes. We've learned how to ship our product through trial and error."

"Our wholesale accounts buy pretty standard stuff. We don't do custom work on a wholesale basis. The only deviation would be on a special–size bed. Other than that, we stick to the standard items on the price list."

Marc spent the first year operating his business alone. After that he hired five assistants.

"Finding capable woodworkers was a problem. Fortunately, I'm happy with about 80% of my help right now. I don't know if there'll ever be a day when I'm 100% satisfied. The same people have been with me for a while. It's hard to find good people, but when you find them, if you treat them right they'll stay. They'll take pride in the work and that's important."

"All of my new employees needed training. None of them could read a tape measure when they were hired. Some had taken a building course, but overall they knew nothing. For a few people this was the first job they'd ever had. I've decided that it's a mistake, to hire people without job experience. I want employees who have had the discipline to work a steady job. They don't necessarily need woodworking experience, though."

The Joinery's wages and benefits are the most important cost item. The company has a pay scale ranging from $8.50 to $11.75 an hour. This is augmented by profit sharing, health insurance, disability insurance and paid vacations—all of which are unusual in a small manufacturing company in today's economy.

The other major cost is the wood: oak, maple, cherry and walnut. Cherry and maple are the most in demand. They use a small amount of western maple and western walnut, but it's hard to get. It took a year before Marc started feeling comfortable enough to pay himself.

"I lived off my savings for quite a while and with the money I made from the furniture, I bought tools." That first year his sales amounted to about $70,000. This year, five years later, they will top $350,000.

Looking around the shop, it is evident that Marc has invested heavily in tools. What I saw was rugged high–quality equipment that will stand up to hard use for years to come. He's purchased the right kind of tools so his workers won't have to stand around waiting for someone to finish an operation before they can do their work. By the same token, the shop is not over equipped. There are no machines standing around gathering dust.

In a small business of any kind, the owner's attitude toward his customers is an important factor in the success or failure. Marc feels responsible for every piece he sells.

"If five years down the road if one of my tables breaks, I have to think about who's responsible. I made it so I am responsible. I don't make extra pieces in the beginning to cover that sort of thing. But, I'm still going to take care of the problem because I have pride in my work. There're six of us here. We do some volume but we care about every piece, and if the customer isn't happy we take care of it."

"I've had a business of some kind ever since I was a kid. Half of what makes up this operation is not just my love of wood, but business sense. This building is the only thing I've bought on credit. I'm a compulsive bill payer and I think it works well for me. My advise for someone going into the woodworking business would be: Build the best product you can, treat your customers right, and don't go into debt." PW

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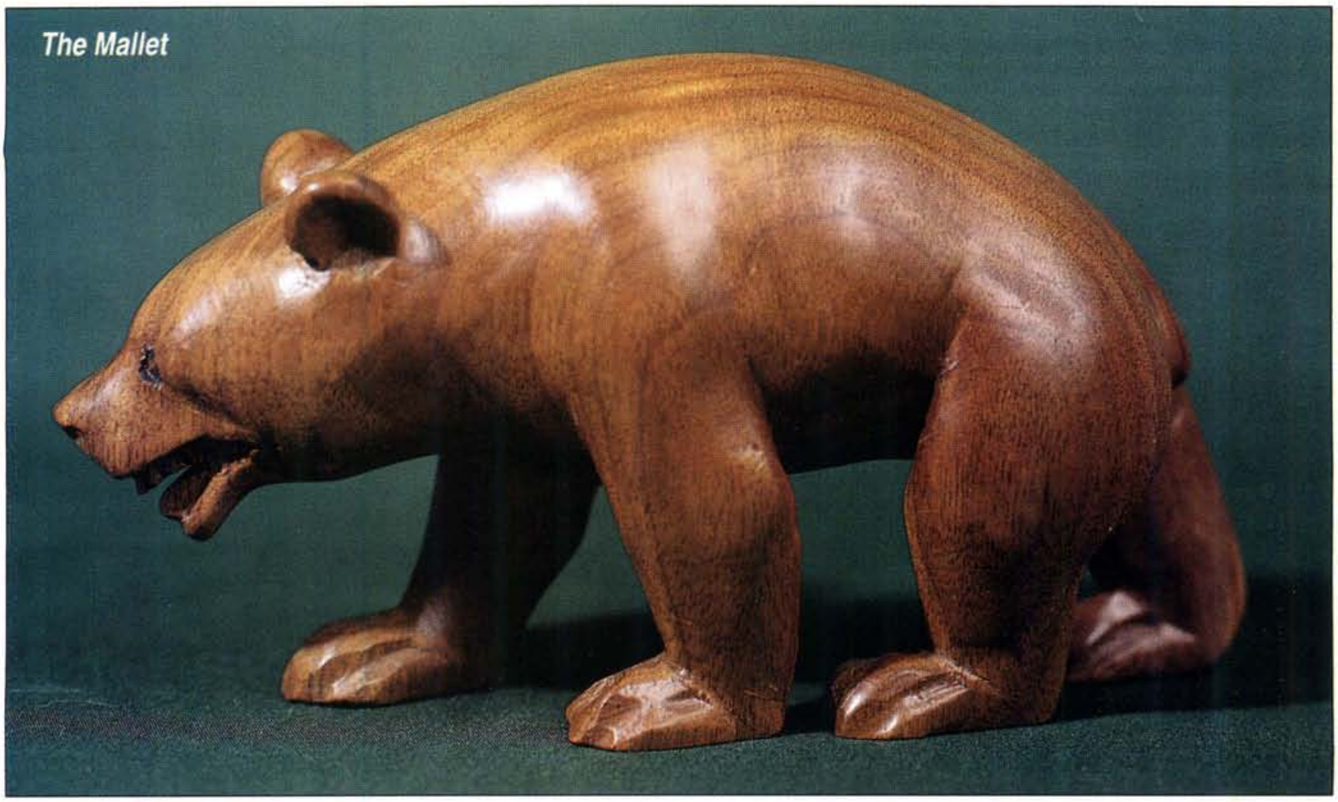


Carve a Bear

A often used but dang'rous is the paring cut.
It rather deeply slices if thou'd watch thy fingers not.
So if thee be awhittlin' keep the wood twixt blade and thumb
A knife knows not from knot nor flesh,
Nor which'n is more dumb.
—anonymous

by Jack Ekstrom

You'll love this wonderful bear for its beauty and form. It fits perfectly in your hand—like a rubbing stone—and as you caress it and smooth it, its beauty and your serenity will grow.

This is a project for carvers who have some experience in using a knife. Beginning woodcarvers should be aware that there are several crucial points in this carving, and there is a specific series of steps that should be followed so your bear doesn't end up with broken toes, ears, or nose. Put off carving those parts of the anatomy until the very end.

A word about tools: while chisels, gouges, coping saws, and even electric carving tools can be used on

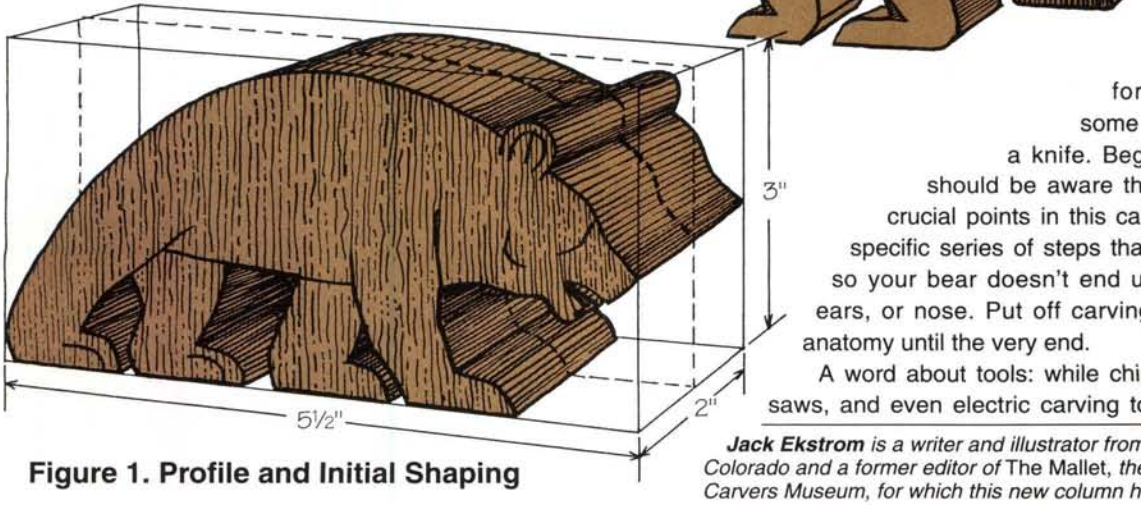


Figure 1. Profile and Initial Shaping

***Jack Ekstrom** is a writer and illustrator from Colorado Springs, Colorado and a former editor of* The Mallet*, the journal of the National Carvers Museum, for which this new column has been named.*

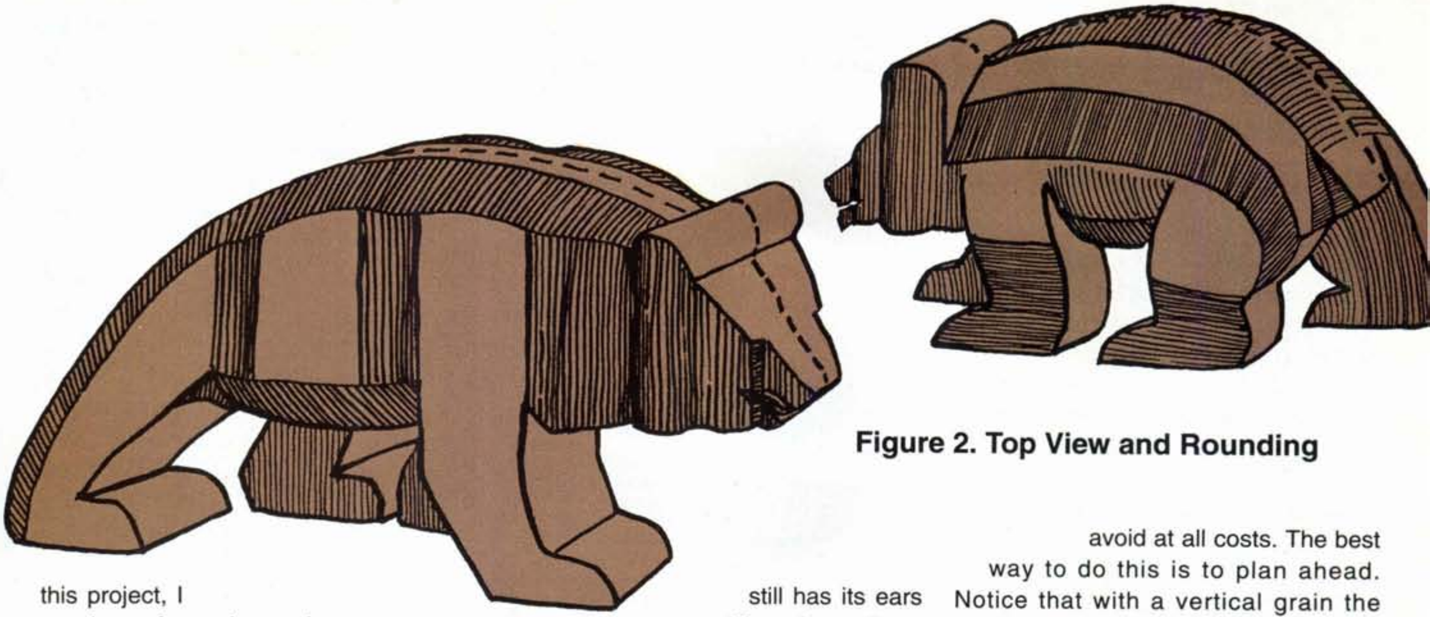


Figure 2. Top View and Rounding

this project, I much prefer using only one knife: the large blade, fixed handle knife #FHLW6 from Warren Tool Co. (Tel. 914–876–7817). It comes razor sharp from the factory, and is the most comfortable and convenient knife I've ever carved with.

Getting Started

Carefully consider the grain of your carving blank. Figure 1 shows the grain of this 2" X 3" X 5½" block running vertically; this is the best grain orientation for this carving, especially for beginners. Banks Stanley, a well-known carver from Frankton, Indiana, who designed this bear, actually carved his (shown above left) from walnut, with the grain running horizontally. This is unusual, and the fact that his bear still has its ears and legs is a tribute not only to his skill, but to the strong grain of his wood. He fit his bear to the grain, which had a particular curve to it just like the bear's back. No doubt the curved piece of wood itself gave him the idea for this carving.

We'll carve ours, however, with the grain running vertically. Transfer the full size side–view pattern on page 29 onto your block, and bandsaw or scrollsaw the rough outline.

Once you have your cutout, draw a centerline all the way around it, top and bottom. You'll carve all the way to this centerline to make it round on top, and you'll also carve the legs all the way to the centerline as shown in Figure 1. Wood will naturally want to break along the grain, something the carver wants to avoid at all costs. The best way to do this is to plan ahead. Notice that with a vertical grain the weakest parts are the toes and the nose. Take good care of these parts as you carve.

The Basic Cuts

The most basic cut is the slicing cut. Hold the wood firmly on your cutting surface (work table, board, etc.) with one hand and slice downward with your other hand, taking small cuts as though you were cutting vegetables.

Another basic cut that works well with wood or vegetables is the paring cut. Hold the wood firmly in one hand and pare away the wood with your other hand as though peeling a potato. The trouble with the paring cut is that you're breaking the first rule of carving safety: you're cutting towards yourself; you're pulling the knife toward your thumb. The paring cut requires that you keep careful track of all your fingers, and always keep wood between the knife and your thumb.

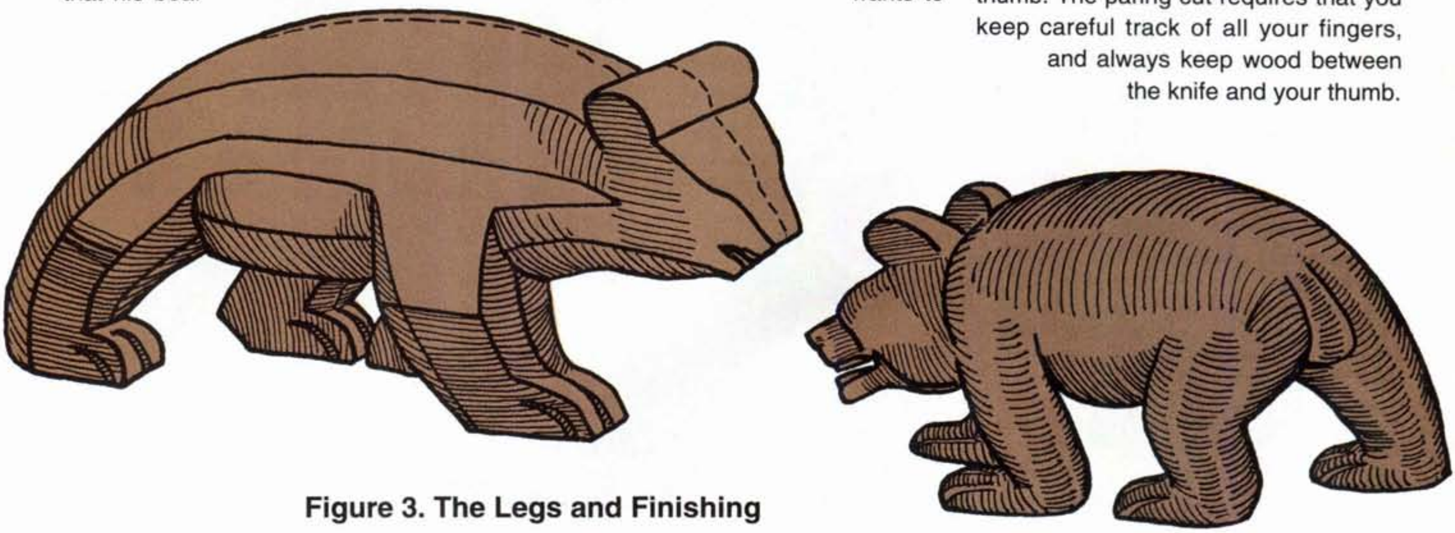


Figure 3. The Legs and Finishing

Start on the bear's back by cutting away the sharp edges, and then start working on the legs.

Because of the vertical grain you'll find the paring cut works best for rounding the back, and the slicing cut is best for cutting the legs.

Your cutout begins with eight legs, and you have to slice away half of them. Get rid of the left front leg, the left rear leg, and the two middle legs on the right side. Keep slicing downward all the way to the centerline to get rid of this wood until your bear clearly has only four legs.

As you remove the extra legs, also begin to round the belly of the bear the same way you rounded the top (see Figure 2). To do this you'll be using the most important cut: the V-cut. It's just two cuts: a cut on the top meeting a cut on the bottom, making a notch. You use it to remove the wood at very important junctions: the pits where the legs meet the belly and neck, the ankles, behind the ears, and between the legs. You'll end up using the V–cut to separate the ears, the toes, and to make all the features on the face.

Roughing Out the Shape

Figure 3 shows you how to shape the bear using the top view pattern. Refer to the pattern to sketch the shape of the head, the round rear and the curved indents of the belly on the top edge of the cutout. Many carvers who claim "I can't draw a thing!" just go ahead and carve the top view without drawing it.

If your grain is vertical, you don't need to worry about the ears at this point. Don't start carving them yet, except roughly along with the rest of the head. You do have to worry about the nose, however, because the narrower you carve it the more apt it is to break. Use the paring cut drawing the knife from the end of the nose toward the body until the nose is the right width. Then leave it alone until the very last. Be sure you don't rest the bear on its nose to carve any other part of the body.

As you carve the shoulders and hips, be sure to round the belly under the bear as shown in Figure 3. The belly should end up nearly as round as the back.

As you round the body be sure to leave no flat areas. Your knife should touch every part of the wood. Keep your knife very sharp so your cuts are smooth and clean. Round the back and belly all the way to the centerline.

V–cut and round the tail with paring cuts toward the body. Be careful not break the tail. Small cuts are best here.

Shaping the Legs

You'll notice on the rear view pattern that this bear has very bowed legs—worse than a cowboy's. Begin shaping the legs by using slicing cuts to remove the lower outside of each as shown in Figure 3.

After you get the right bow to the outside of the legs, cut the bow on the inside of the legs (see the rear view of Figure 5). This will mean removing a lot of wood at the tops of the legs, which will make rounding the bear's belly easier. But be careful with the feet. Carve the legs above the feet with slicing cuts until you approach the top of the feet; then use paring cuts above the feet toward the body. Be careful of the grain, and

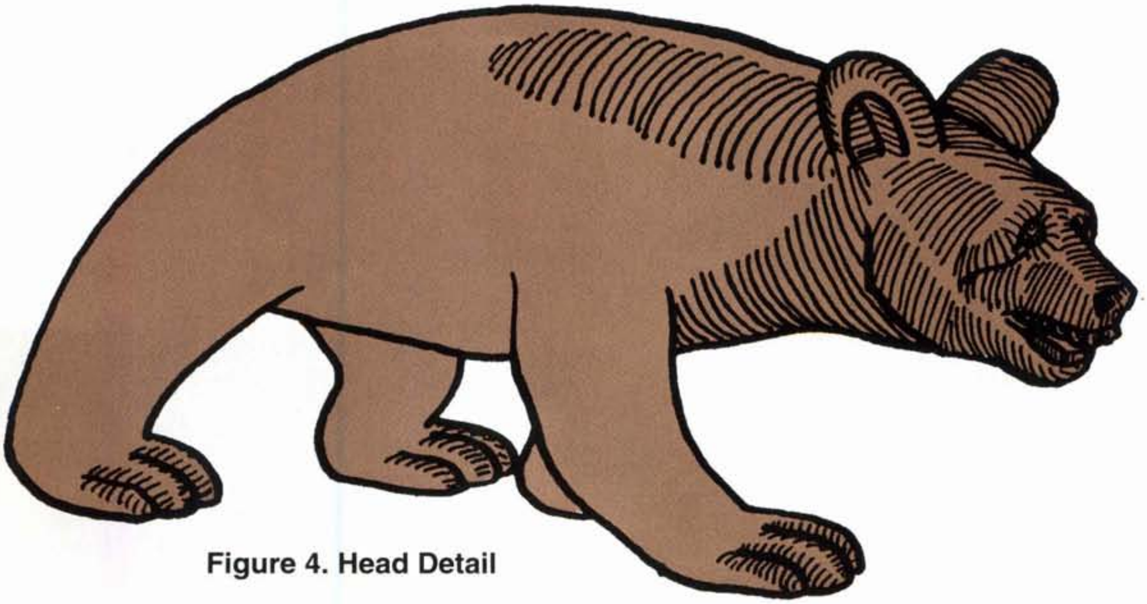


Figure 4. Head Detail

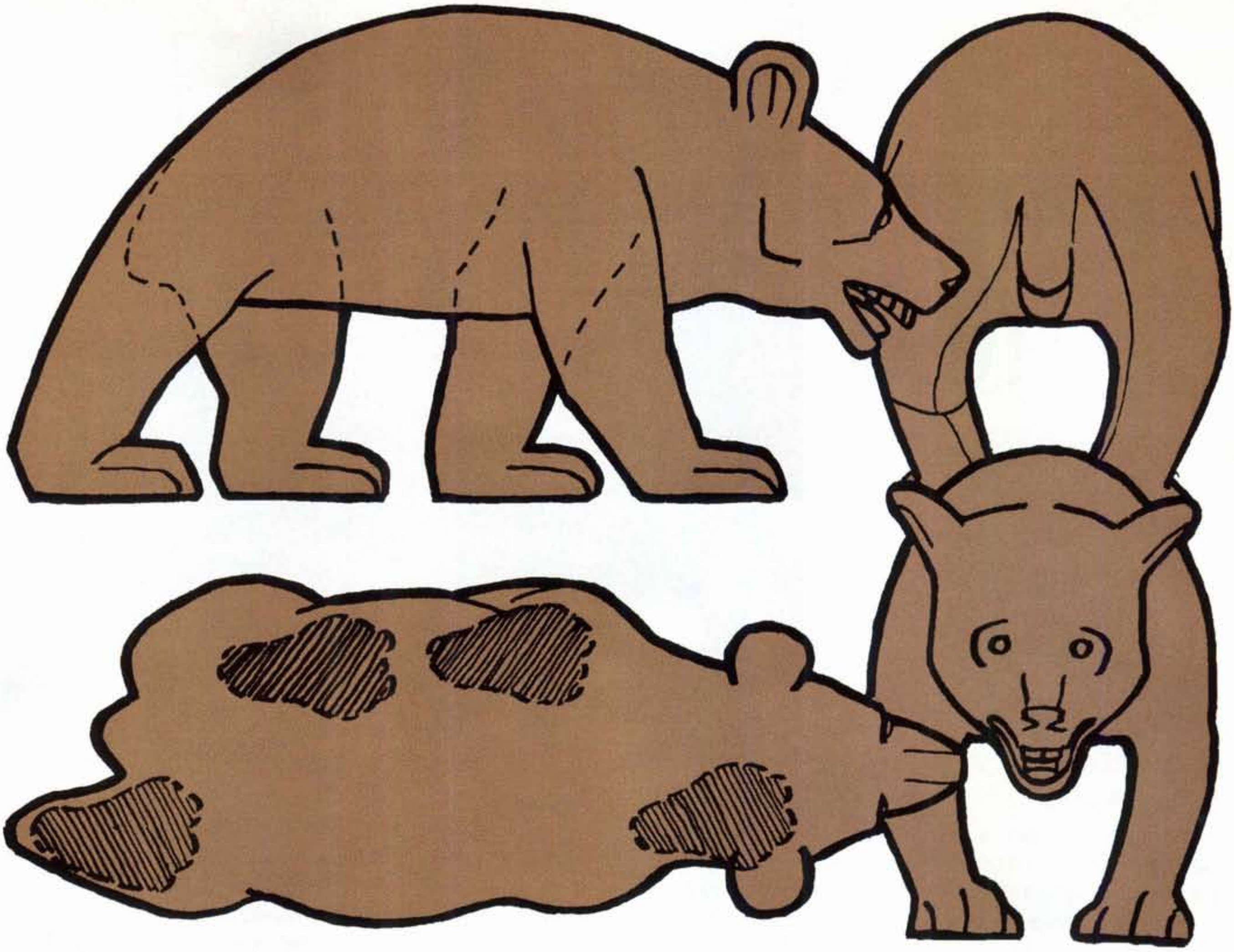


Figure 5. Full–Size Pattern

don't cut too deeply or use too much pressure because even the legs could break as they angle across the grain. As you shape the legs, make them as round as you can, leaving no flat wood (see Figure 4).

Now V-cut the ears and begin shaping the head, making the neck round underneath and the head round between the ears. *Don't* stop on the body yet until you have completed it, with every part as round and smooth as you can get it, even the feet (which you've saved for last). Leave a slight ridge right down the middle of the back where the backbone is. To get the bear as smooth as the one shown here by Banks Stanley, you're going to have to sand and sand, first with a coarser grit and then very fine. However, lots of carvers prefer to leave their knife marks as part of their finished carving, as long as the marks are smooth. Still other carvers even go to the trouble of V–cutting many little hairs. Feel free to carve as many as you have patience for.

Detailing the Head

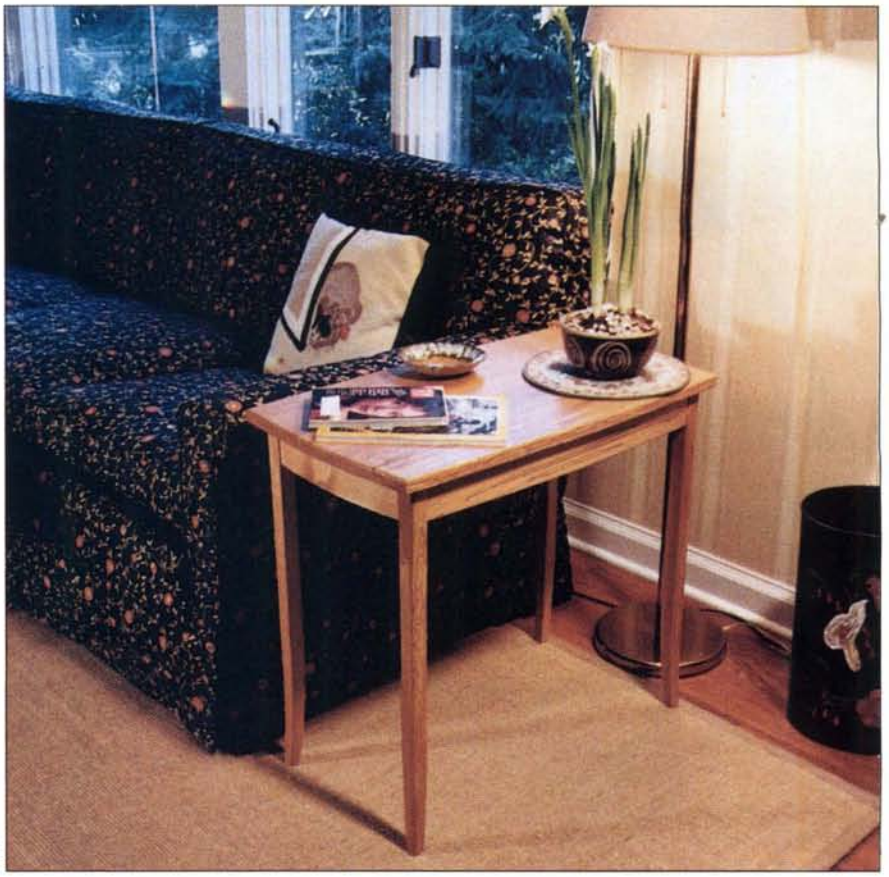
Many carving instructors would have had you carve the bear's head first, because if the bear's head doesn't turn out right, then all your effort has been wasted. But carvings turn out best when all parts progress evenly through rough shaping, though it would be a good idea to just carve a few bears' heads before you carve the one on the body. Practice on scrap blocks of wood about 1½" square. You can turn each of these little bear heads into a bolo tie or drill a hole between the ears for a neckerchief.

Most of the cuts you'll initially make on the head will be paring cuts, always pulling toward the body. Use the very tip of your knife to V–cut the nostrils, the inside of the ears, the eyes and eyebrows, and finally the teeth and tongue. As shown in Figure 4, the ears should be round on top and in the back. The top of the head should be fairly round although bears have flat heads—especially at the eyebrows. Make the top, sides, and front of the *nose the flat*test. The jaws can be a little flat too, as they give shape to the head in front of the neck. Carefully finish the toes using the very tip of your knife.

To complete the bear, sand the head as thoroughly as the body. Tung oil is a marvelous finish to paint the bear with, as is Deft lacquer or brown stain. Give it several coats, sanding lightly between each coat.

Then hold it in your hand and rub it for years. You two'll be good friends. PW

A Dancer's Table



author

by Ken Sadler

Some years ago, a lovely young lady came and asked me to make her a pair of small tables. She wanted them to be simple with a delicate air, like the ballet dancer she was. This is the table I designed and made for her. Two of them grace her living room, at either end of the couch, and elicit admiring comments from her friends.

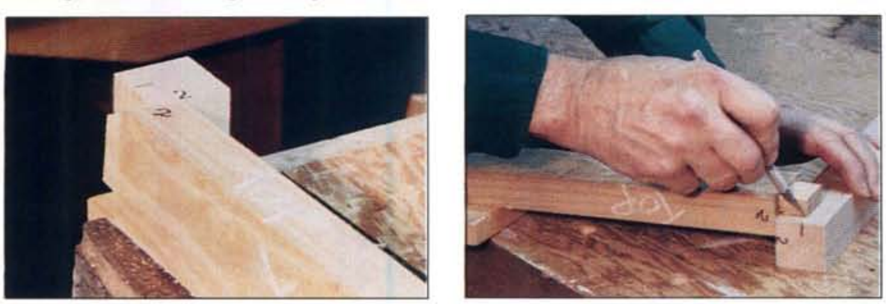
To capture the right feeling, make this table from a light colored wood such as western maple, alder, cherry or birch—the finish is natural. The top should have an interesting and distinct grain pattern. Dark woods look heavy and spoil the delicate air.

***Ken Sadler** is a retired furnituremaker in Portland, Oregon.*

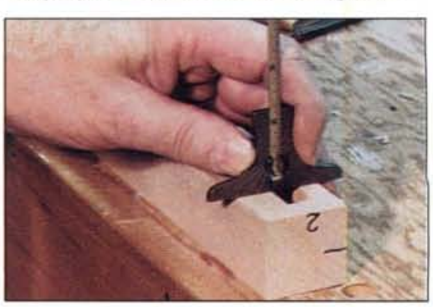
This table is an easy piece to make. It consists of four legs (A), two side aprons (B), two end aprons (C) and a top (D). Cut the legs to the dimensions given in the Cutting List and joint two adjacent faces. All faces must be square with each other. Cut the side aprons (B) to size, and joint the two $^{13}/_{16}$" faces and one $2^{1}/_{4}$" face. Again, all faces must be square with each other. Cut the end aprons (C) and joint these the same as the side aprons. Don't lay out or cut any of the parts to shape yet.

Mark the jointed $2^{1}/_{4}$" face on all the aprons with chalk to establish the inside face. Measure from this face and lay out and cut the tenons on all the aprons as shown in Figures 1 and 2, but don't cut the 45° angle on the ends just yet. The tenons must not exceed $^{13}/_{16}$" in length. The distance between the tenons does not have to match the Figures exactly, but each pair must be exactly the same. Match the two pairs back to back; establish which edge is the top and mark it. Set the aprons aside for now.

On the legs (A), the corner common to the two jointed faces is the inside corner. Assemble the four legs in a square with all the inside corners together in the center. On the top ends, mark the mating faces in a clockwise direction from one to eight. Determine where each apron will go and mark the top face at each end with the number of the leg face that it will mate with. The



Cut the tenons then establish the inside and top face on the aprons and number the mating ends on the legs and aprons. Use a knife to mark the locations of the mortises.



Use a gauge to ensure the mortise walls are perpendicular with the mating face.

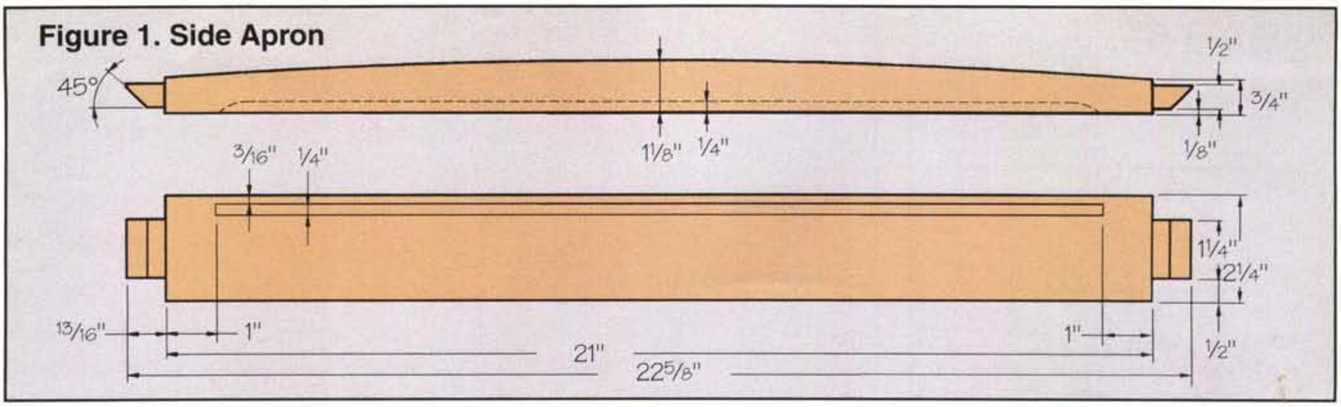


Figure 1. Side Apron

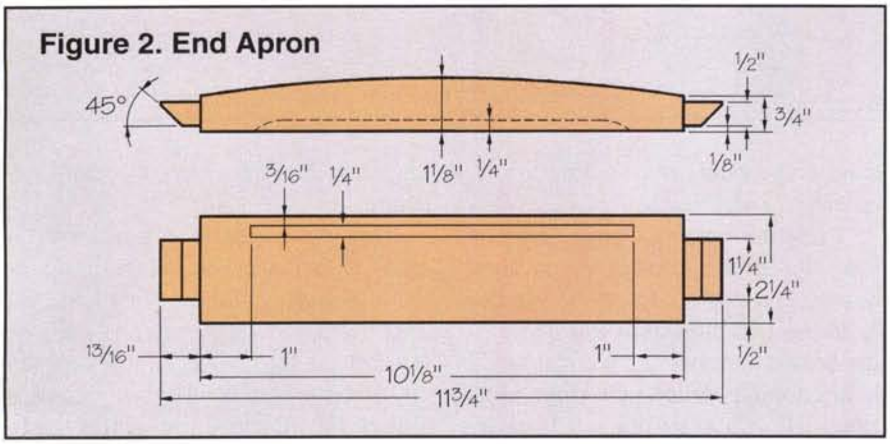


Figure 2. End Apron

mortises go in the jointed face. Place the tenon on the leg with the top of the apron and the top of the leg flush with each other and mark the top and bottom lines of each mortise with a sharp knife. Measure from the inside corner to locate the inner vertical line of the mortise as shown in the leg detail. Measure the thickness of the tenon and locate the outer vertical line. Using the actual tenons to locate the horizontal lines and the outer vertical line of the mortises is important for a good fit.

When you've laid out all eight mortises, cut them. It's very important that they not exceed 7/8" in depth. I've found that the easiest way to cut a mortise is to drill out the main waste and then clean up the sides to the lines with a chisel. If you use a spur bit in a drill press with a depth gauge, you can be sure you don't exceed the 7/8" depth. Set your gauge so the cutting edge of the bit establishes the depth, not the point of the spur. It's also important that the sides of the mortise are perpendicular with the face. I use a depth gauge as a square to check this.

Insert the apron into the leg and mark the location of the 45° cutoff on the tenon.

As you fit each tenon in its mortise, draw a line with a sharp pencil on the face of the tenon that shows through the opposing mortise. This is the line you use to cut the angle on the end of the tenon. Be sure you have the tenon in the right way; if you cut the angle backwards, you'll have to throw the apron away and start over. When the mortise and tenon have been properly fitted there is 1/16" between the bottom of the tenon and the bottom of the mortise.

Refer to Figures 1 and 2, and rout the groove shown on the inside face of the aprons. This groove receives the hold–down clips that secure the top in place. Before going any further, assemble all the pieces and check that they fit together tightly and that the assembled structure is square in all directions. This is the only way you can check for interference between the tenon ends in the mortises.

The easiest way to mark the curves on the legs and aprons is from templates. Even though you may never use them again, using templates is better

Pay attention to which face the template goes on—one mistake ruins the whole leg.

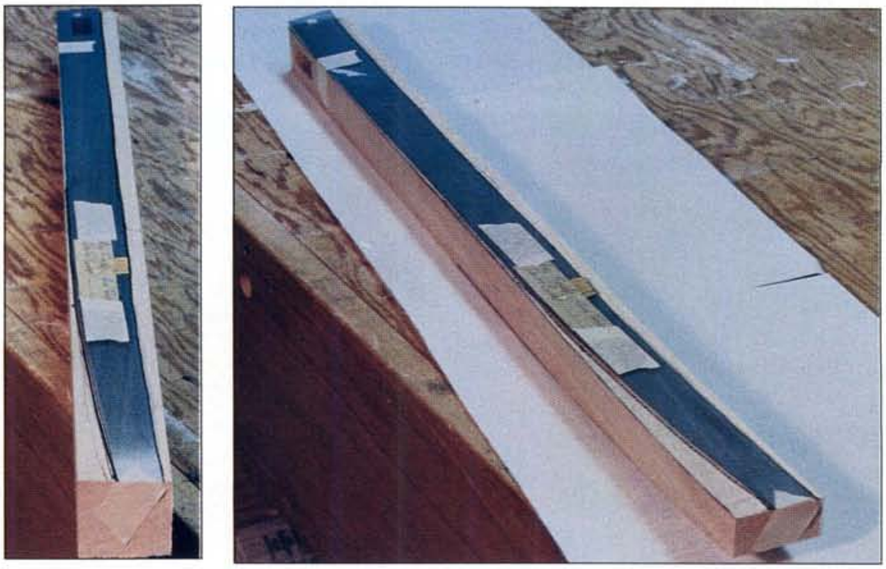


Figure 3. Hold Down

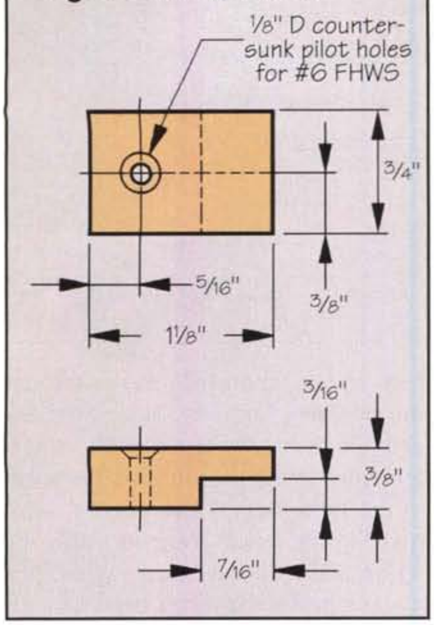
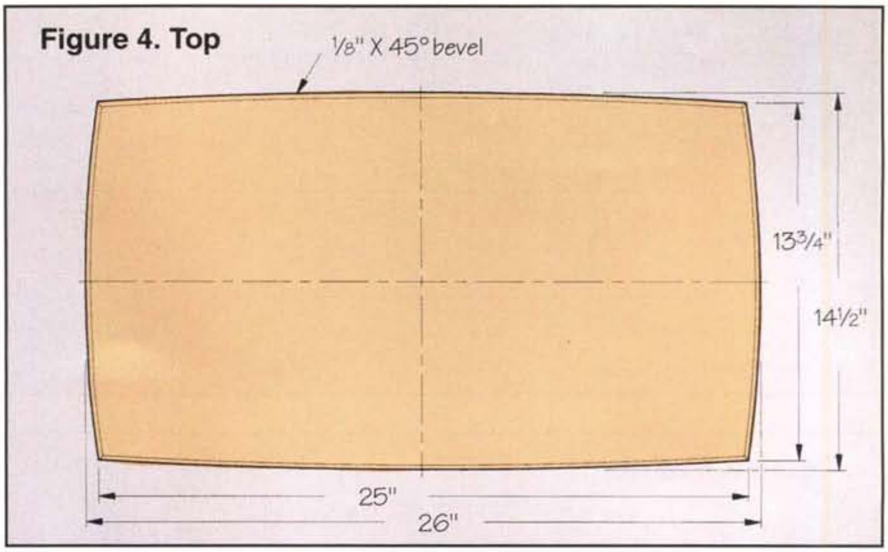


Figure 4. Top



than doing the layout on the piece. A template assures that the pieces will all be the same shape. For best results, a cardboard template should be about the thickness of the back of a scratch pad. Make the templates using the patterns in the PullOut™ Plans.

The legs curve away from the inside corner. Place the template on the leg with its back edge against the inside corner, its top flush with the top of the leg, and draw the shape. Bandsaw to this shape. Repeat for all four legs. Now place the template on the other inside face, and be careful to get the curve in the right direction. Take great care with these markings; it's easy to get confused. If you do, the best that will happen is that the leg will curve inward—the worst is that you'll cross the curved cuts, and destroy the leg entirely.

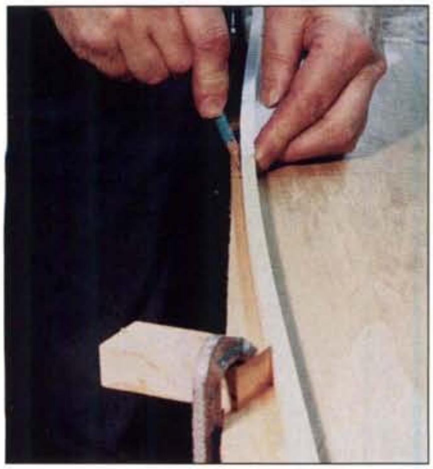
Trace the apron templates onto the top edge of the aprons. When bandsawing this shape, I found that it's best to make two cuts from the center in opposite directions. At the ends, the cut is at an angle to and very close to the tenon. If you start the cut from the ends, you'll encounter interference with the tenon.

Smooth all the sawn faces with a spokeshave; then sand beginning with 80–grit paper. If your spokeshave is sharp and you're careful, you can bypass the 80–grit and begin with 150–grit. When sanding the legs, go very lightly around the mortises so you don't alter the flat surfaces. On the aprons, leave the top edge sharp and put a small radius on the bottom edge—1/8" would be fine. On the legs, put a 1/8" radius on all vertical corners. Put a 1/16" bevel on all four horizontal edges at the foot. Leave the top edges sharp.

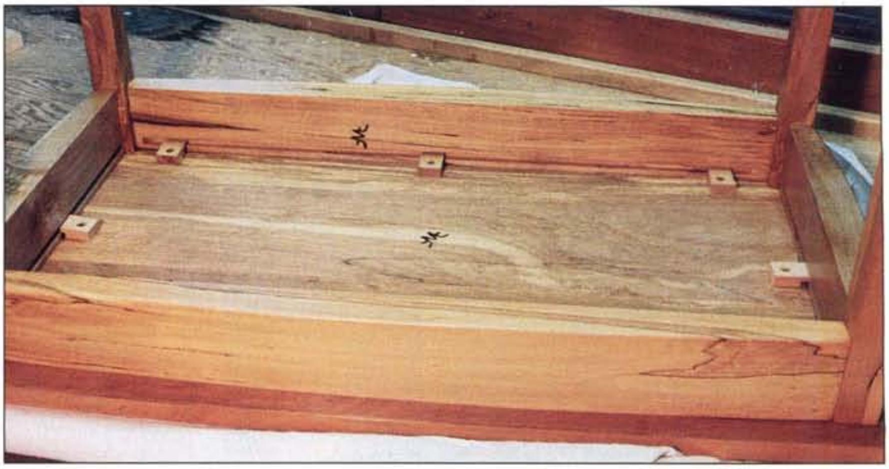
Now you're ready to assemble the parts for a final check before gluing. Be sure everything fits as it should. See that the aprons fit tightly and squarely against the legs when all the parts are assembled. This is your last chance to check for interference in the joints. When you're satisfied, glue the legs to the end aprons (C) first. Put the pieces together and use a bar clamp to hold them. See that the legs are square with the apron. Look in the side apron mortise and make sure there isn't excess glue where it will interfere with the side apron going home. When you glue these joints, do not put glue on the tenons—put it on the top third of the mortise walls. When you assemble the joint, the tenon wipes the glue down over the rest of the wall.

When the leg and apron parts have dried, assemble them to the side

To get a symmetrical line, use a piece of scrapwood with a uniform thickness.



Holddown clips allow the top to easily expand and contract with changes in the humidity.



aprons in the same manner and the base is done. While you're waiting for the end assemblies to dry, glue up the top (D). Depending on your equipment, you can make the top with two, three, or four boards. The appearance of the top is important, so use wood with an interesting grain pattern. If you can find a 2" thick board with a pattern that will make an interesting book match, you could use it for the center and match two 1" thick pieces on either side. Make the glued up panel slightly larger than the finished top. Since all the edges of the top will have a slight curve, the best way to lay it out is to draw end to end and side to side centerlines, and work from them.

Here's an easy way to draw the curved lines. Cut a ⅛" X ⅝" stick and make it 6" longer than the length of the top. Clamp small blocks so a corner of each block is positioned at a corner of the top. Now, place the stick on edge and against the blocks, and with your finger on the centerline, pull the stick into position at the center. Hold it there and draw your line. When the lay out is complete, bandsaw the shape; then clean up and smooth the edges. When you have as slight a curve as these, I've found that a smooth plane works better that a spokeshave; you can get a smoother curve with it. Put a slight radius on the bottom edge and a ⅛" bevel on the top edge. Do both of these operations with a spokeshave. On the ends, you're cutting across the grain so be sure your spoke shave is sharp, otherwise you'll get tearing that is hard to get rid of.

Make eight holddown clips (E) as shown in Figure 3. Place the top upside down on the bench and center the base on it. Mark the position of all four corners with a pencil. Place three clips on each side and one at each end. Put #6 X ⅝" flat head brass screws in them, and tap them to mark the top. Remove the clips and the base, and drill pilot holes at the marks. I used a 5/64" drill bit with masking tape wrapped around it ½" from the point. Use a hand drill, not an electric drill. This is the best way to be certain you don't accidentally drill through the top. Put the base back on the marks with the clips in place and drive the screws.

Set it on the floor, stand back and admire it—it's ready for finishing. I'll say the same thing I always say about finishing: don't use any stain. Several coats of Formby's Tung Oil Finish does a very fine job. If getting the finish sheen you want takes too many coats, you can take a shortcut. After the first two or three coats, apply a coat or two of paste wax. Be sure it's paste and not liquid or spray; these contain water and will ruin your finish. A friend of mine who refinishes high-quality antiques told me to use Trewax. I found that it does an excellent job.

I made quite a few little tables after those first two. Look around your house, you may find a place for another one. PW

A Dancer's Table

Cutting List

Qty	Part	Finished Size T	W	L	Piece
4	A	1½"	1½"	23¾"	legs
2	B	1³⁄₁₆"	2¼"	22⅝"	side aprons
2	C	1³⁄₁₆"	2¼"	11¾"	end aprons
1	D	¾"	15"	27"	top
8	E	⅜"	¾"	1⅛"	holddown clips

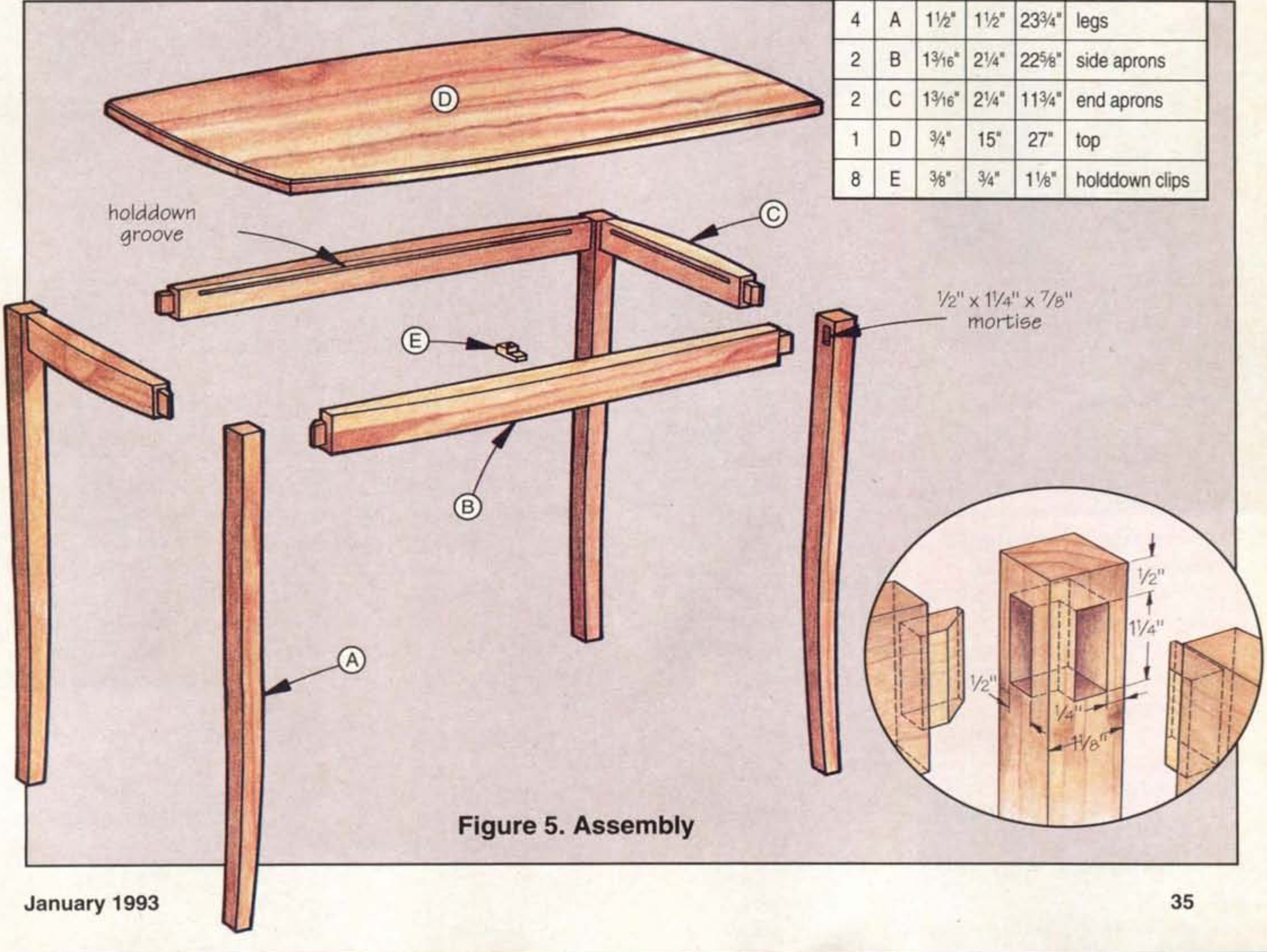
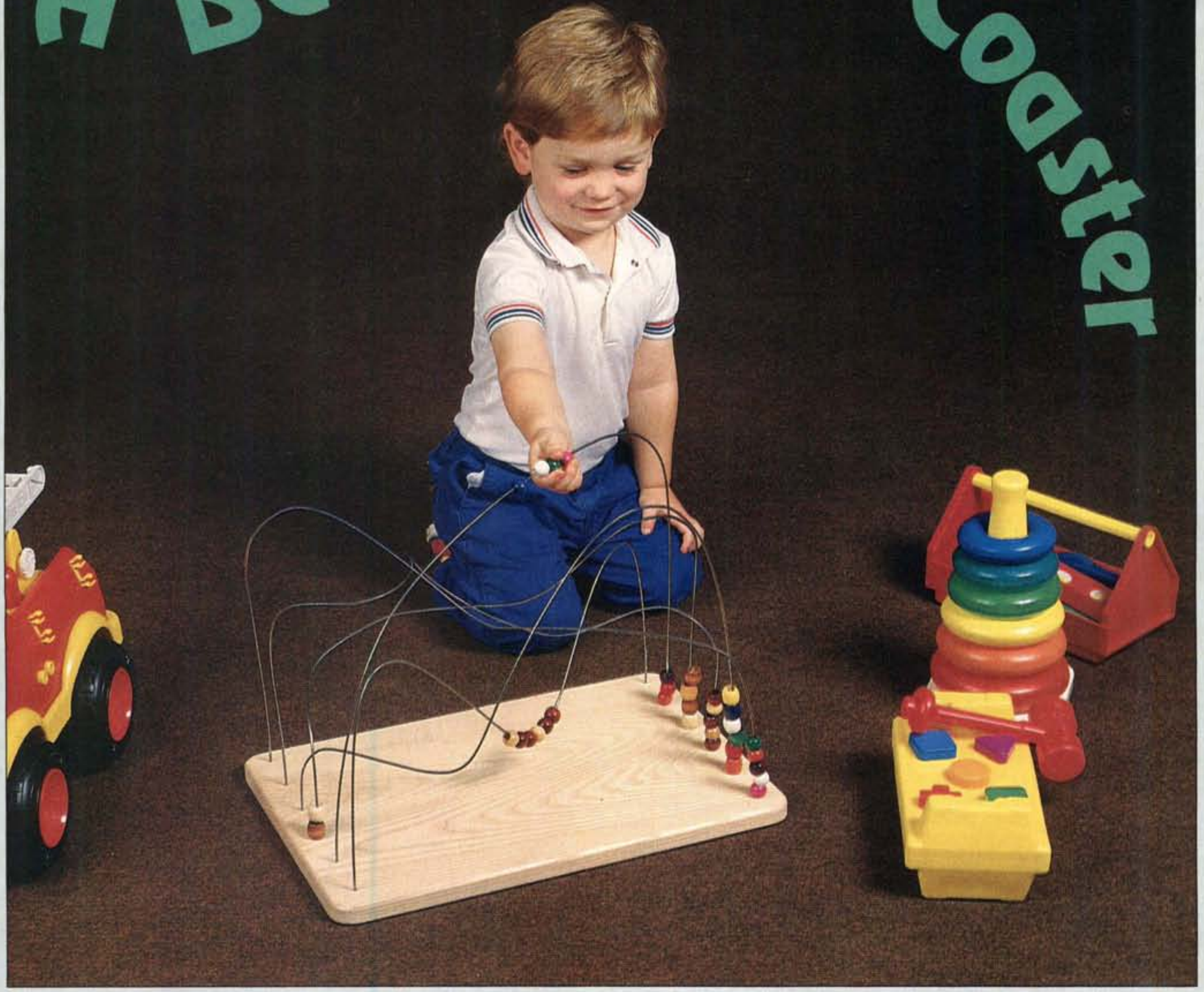


Figure 5. Assembly

A Popular Woodworking Project

A Bead Roller Coaster



by Bill Neal

A bead roller coaster provides hours of stimulating entertainment for both toddlers and pre–schoolers. Child development specialists tell us that small children use play to refine their motor skills and develop good hand–eye coordination. As you can see, Sean is having a fun time with the one we made.

Put together a 12" X 18" hardwood platform—we used ¾" ash for this project. Give the corners a 1" radius and round over the top edges with a ⅜" roundover bit in your router. Measure in 1" from each end and 1" from the sides and draw a faint line at each end. Make a mark every 2" along each line and drill twelve 3/32" X ⅝" deep holes at the marks. Finish the wood before you proceed. We used Minwax's Wood–Sheen® frosted stain and finish in Coral Peach. The color looks terrific on the ash and application was a breeze.

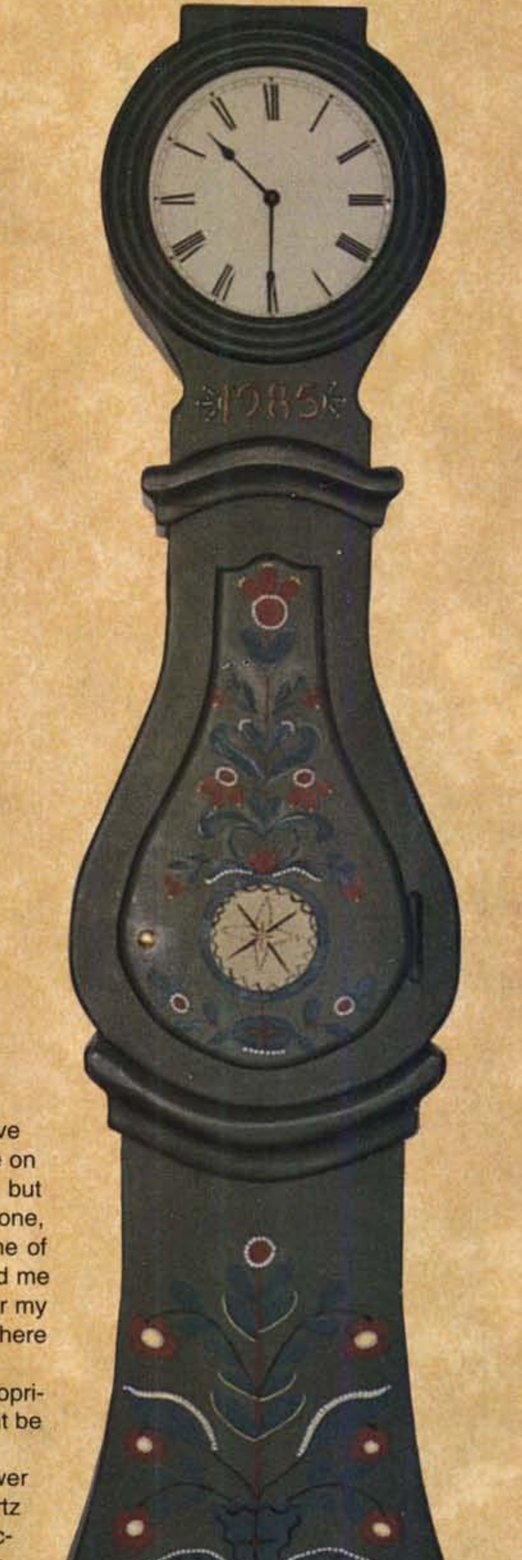
We got our beads and wire at the local hobby and crafts store. The wire is 0.10" X 36" music wire. It's stiff yet easy to bend. You may also want to consider covering the wire with a plastic coating or ⅛" heat shrink tubing—it's available in black, red and blue at most electrical supply houses.

Insert one end of the wire into one of the holes and the other end into any one of the holes on the other end. Bend the wire in place to the desired shape. Repeat for the next wire and so on. As you bend them around other wires you may need to remove one of the ends, then replace it. Leave enough room around each wire for little hands to maneuver in and out. When the wires are positioned to your satisfaction, remove one end and thread the beads on. Apply a drop of cyanoacrylate (such as Devcon's Super Glue) in the hole and reinsert the wire. Glue in both ends of each wire.

Place the bead roller coaster on the floor and invite that special youngster to play. PW

***Bill Neal** works wood in Nashua, Iowa.*

Painted Swedish Clock



by Lars Soderberg

The bold, feminine shapes of the painted country clocks from Sweden have caught my eye for as long as I can remember. I first saw one as a child while on a tour of Sweden in 1939. These clocks are very rare in the United States, but exist in Sweden as relics of a vigorous peasant culture. I've always wanted one, but they are rare and expensive. It became clear that if I were to posses one of these clocks I would have to build it myself, so I had a friend in Sweden send me a sketch of such a clock. I have since built several clocks as wedding gifts for my children, a traditional usage of these clocks. The design of the clock shown here is a composite of many clocks I've studied.

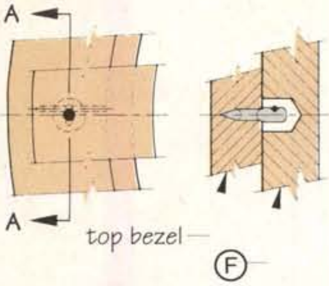
These clocks were built in various sizes and shapes and it is entirely appropriate to vary the dimensions given. A smaller clock—about five feet high—might be more appropriate for a small apartment.

The clock is designed to use a quartz or pendulum movement. The lower bezel functions only as an opening to see the pendulum. If you use a quartz movement as I did in the clock pictured here, then the lower bezel is only decorative and can be left off. You'll need a clock face that is 11¾" in diameter with a 10¼" time ring and spade hands.Clock movements can be purchased from *Klockit*, PO Box 636, Lake Geneva, WI 53147, tel. # 1-800-556-2548.

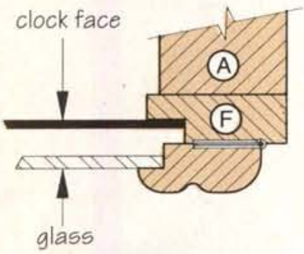
The first step in building the clock is to make a set of full-size plans from the scaled drawings on page 38. Make a construction template by transfering the front pattern to a sheet of ¼" plywood; then cut it out.

***Lars Soderberg** works wood in Flemington, New Jersey.*

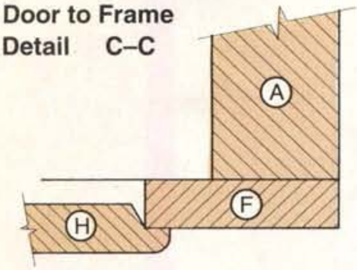
Bezel Latch Detail A–A



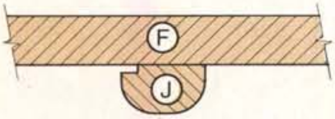
Bezel Hinge Detail B–B



Door to Frame Detail C–C



Lower Bezel Detail D–D



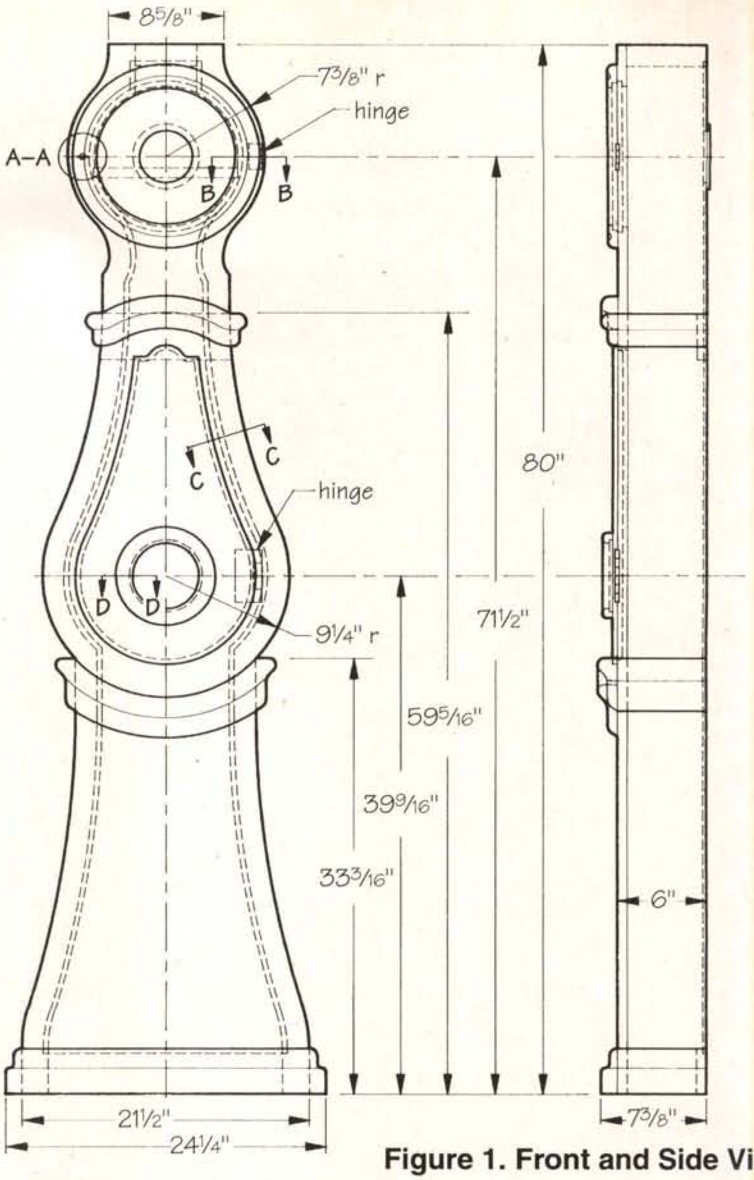
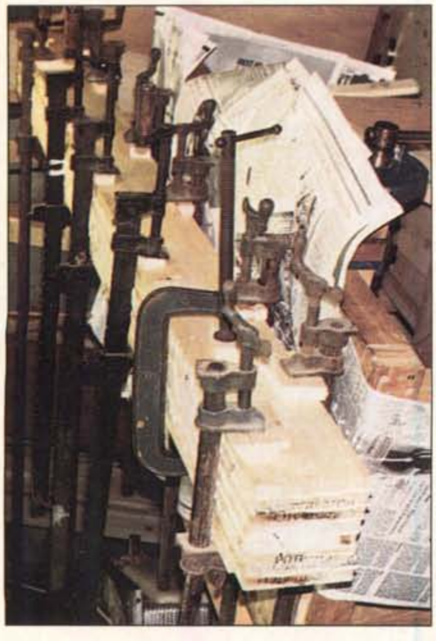


Figure 1. Front and Side Views

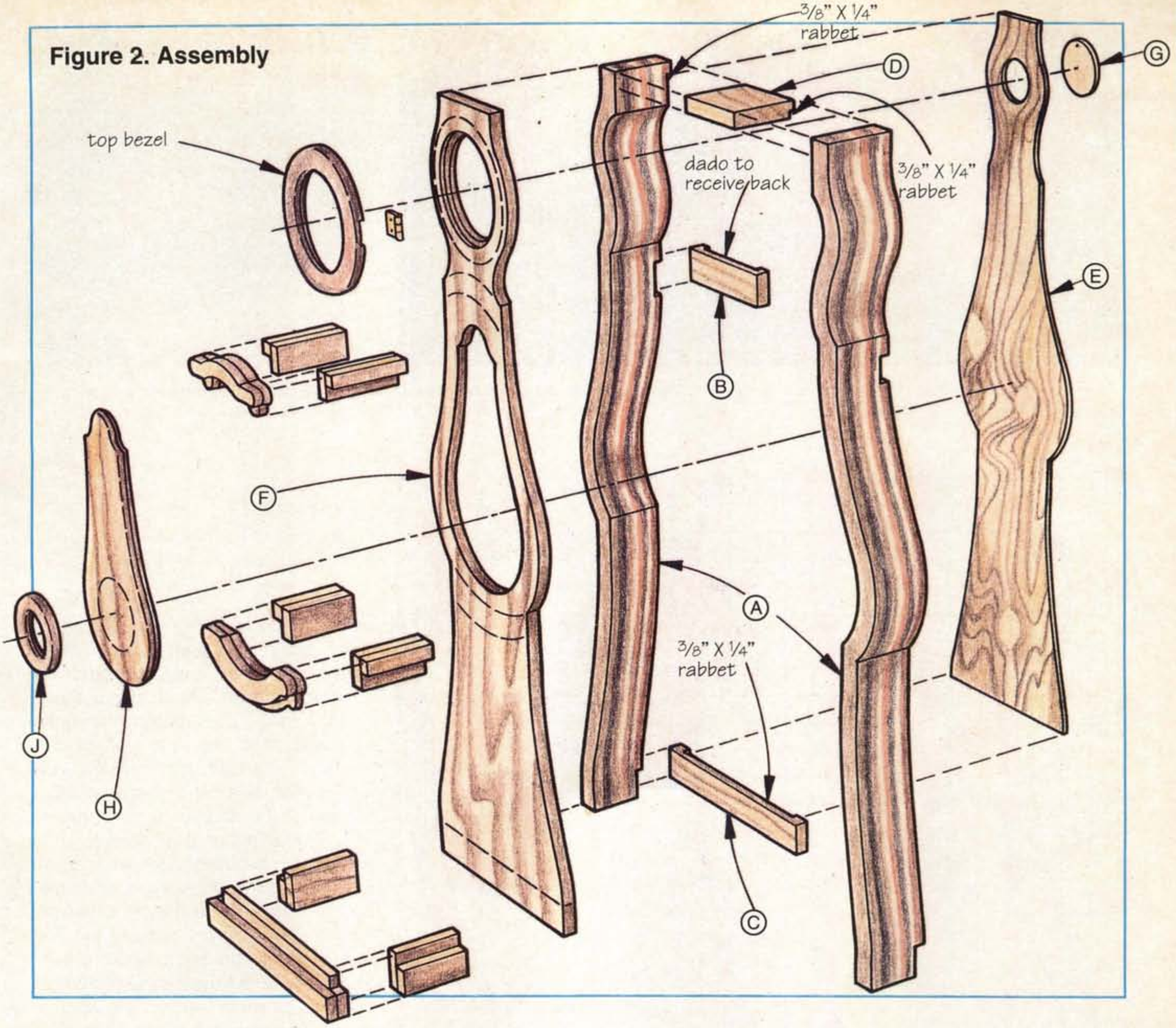


Use plenty of glue when laminating the side beams. Newspaper between the glue–up and work surface will prevent the clock from staying in your shop.

Dress both sides of each beam after cutting them out.

To make the side beams (A), laminate eight pieces of ¾" thick stock for each beam. Buy fourteen–foot 1 X 6's and cut them in half; or use shorter pieces, alternating butt joints end for

Figure 2. Assembly



Swedish Clock					
Cutting List					
		Rough Size			
Qty	Part	T	W	L	Piece
2	A	6"	6"	80"	side beams
1	B	¾"	3½"	9½"	top crossbrace
1	C	¾"	3½"	21½"	bot. crossbrace
1	D	6"	2"	4⅝"	top
1	E	¼"	18¼"	75¼"	back
1	F	¾"	21½"	80"	front
1	G	¼"	5"	5"	cover plate
1	H	¾"	13½"	24⅜"	door
4	I	¾"	3½"	14"	top bzl. pieces
1	J	¾"	7½"	7½"	lower bezel

end as you build up the layers. Use a roller to apply the glue and drive nails into the waste areas to hold the assembly in line while clamping. When the glue is dry, mark the beams with the pattern (note: flip the pattern for the other side) and bandsaw them to shape. Dress both sides of the beams and (temporarily) nail them in position on the full–size template.

Cut the cross braces (B and C) and top (D) to size as given in the Cutting List. Use a dado setup to remove the waste in the the upper cross brace (B) where the back (E) will be inset. Mark and notch (3½" X ¾") the side beams to recieve the cross braces as located in Figures 1 and 2. Glue and clamp the cross braces and top in place. When the glue is dry, rout a ⅜" X ¼" rabbet around the interior perimiter of the side beams, top and cross braces to receive the back.

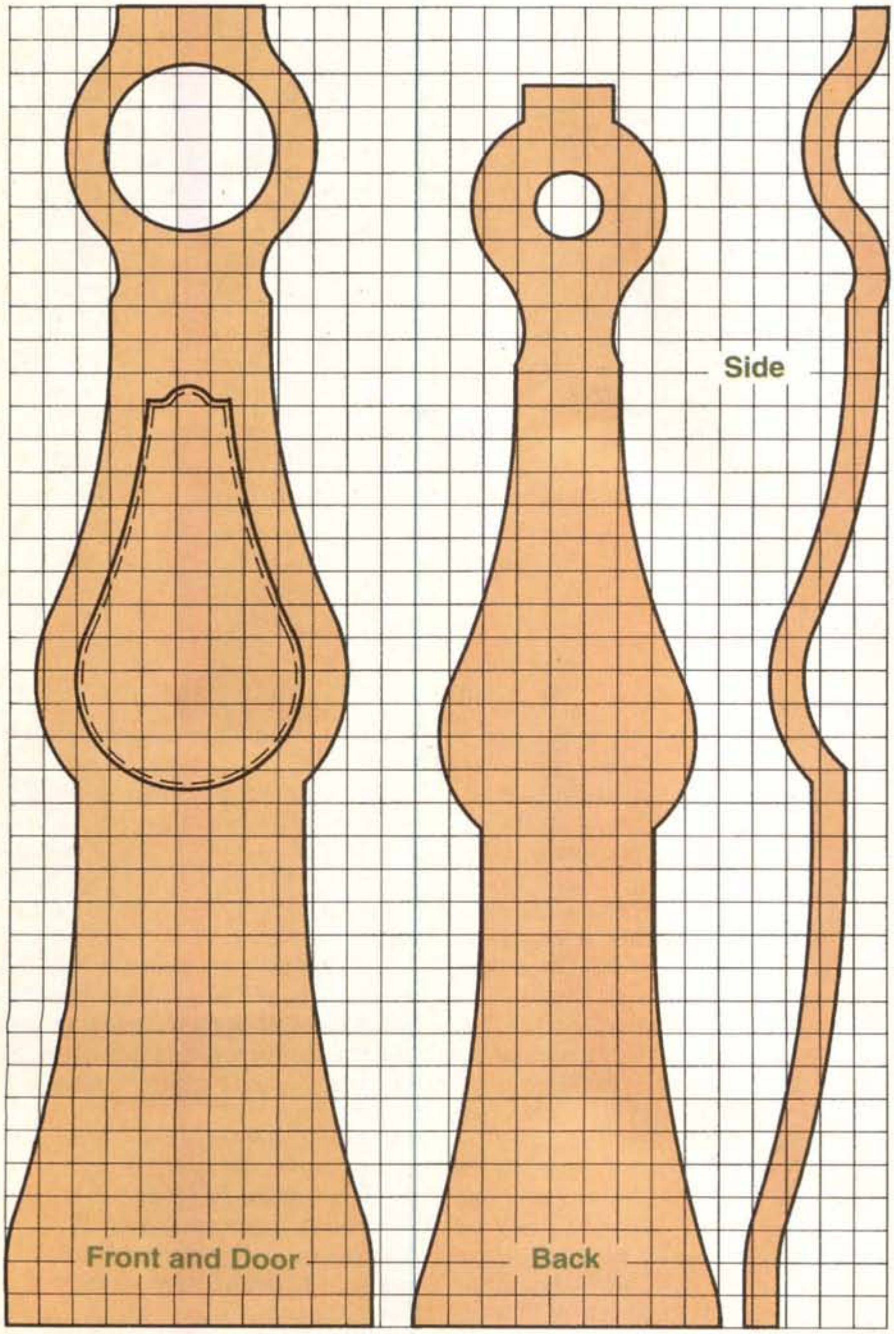
Cut out the back (E) from a sheet of ¼" plywood and set it aside. Make the front (F) from ¾" stock. You can make it as one solid panel or as three shorter panels with breaks at the moulding lines.

Remove the front template from the side beams and attach the front with glue and finish nails. Cut out the circle for the clock face and rout a ⅜" X ⅜" rabbet on the front to set the clock face in (see Figure 2). Install mounting brackets to suit your clock movement as shown in the photo on page 40. Sand the exterior perimeter of the clock to remove all machine marks.

Turn the assembly over and apply one coat of sealer to the interior surfaces. Glue and finish nail the back in

After attaching the rough mouldings to the carcase, they are ready to be finish shaped with chisels, rasps and sandpaper.

Install mounting brackets to suit your clock movement.



Patterns
scale = 2"

place. If you're using a quartz movement, cut a hole near the top of the back, and make a small swinging door so you can change the clock battery

Cut out the door opening as noted by the dashed line in the plans. The clock's door doesn't have to work unless you use a movement with a pendulum. If the door is to be operable, use 1" thick material or hardwood, as the hinge connection is a point of weakness. Make the door (H) as indicated by the solid line on the front pattern. Round over the front edge of the door with a 1/4" roundover bit. Make a 3/8" X 3/8" rabbet on the back edge of the door and then glue it in place. If you want the door to be operable, bevel the inner edge of this rabbet as shown in the Door to Frame Detail of Figure 1 so the door swings smoothly when installed. Mount the door with a single mortised hinge as located in Figure 1.

To make the clock bezel, cut four pieces of hardwood (I) to size as given in the Cutting List. Make a square frame from these four pieces by cutting half lap joints on both ends of all four pieces. Assemble the frame with glue. Rough shape the bezel, mount it on a plywood backing plate, and mount the bezel and backer assembly to a face plate. Turn the bezel to the dimensions given in Figure 3 decorating as you see fit. Remove the bezel from the backer board and rout a 3/8" X 3/8" rabbet inside the back of the ring to accept the glass.

I made up my own latch to hold the bezel door closed as shown in the Bezel Latch Detail of Figure 1. I used a

Figure 3. Clock Bezel

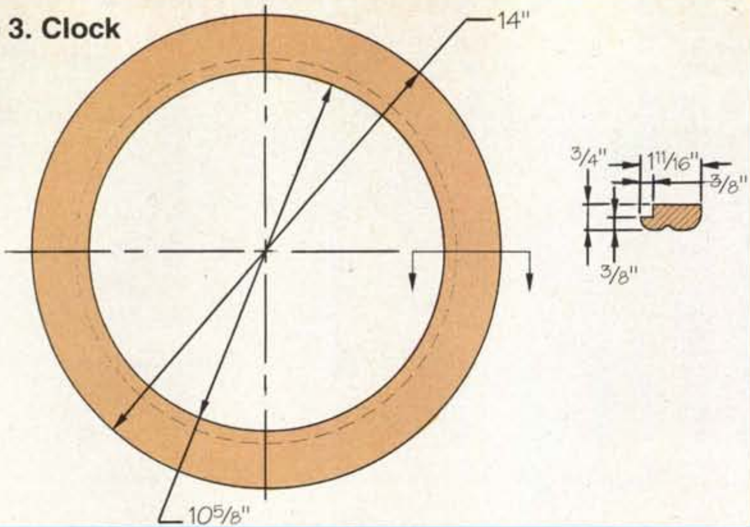


Figure 4. Lower Bezel

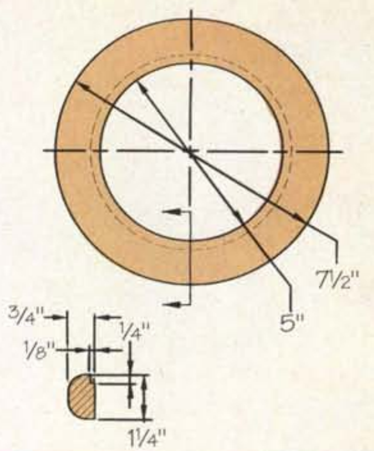
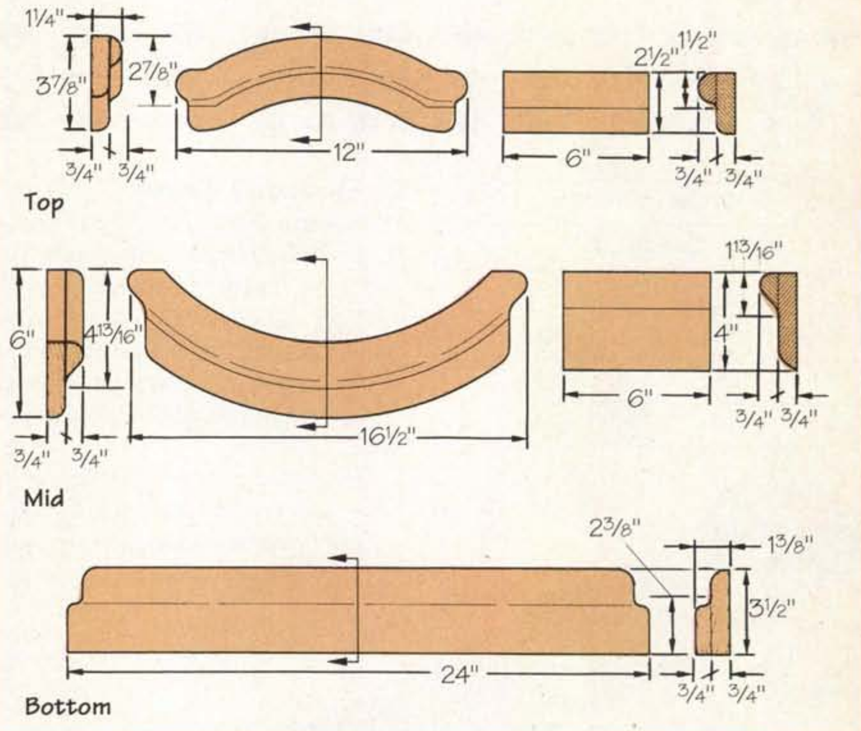


Figure 5. Moulding



section of a 16d nail hammered flat on one end and ground as shown. Drill a slightly smaller hole in the bezel, and drive in this pin at the 9 o'clock position. Drill a ½" diameter hole through the front of the carcase at this same position and drive an 8d finish nail across the center of this hole so that it will catch the ground nail in the bezel and hold the bezel shut. Do not drive the finish nail home as its location will require some adjustment for the catch to seat properly. Once the bezel closes correctly, cut the finish nail off and drive it in so it doesn't show.

If you use a pendulum movement (the case is sized for a 32" pendulum) you'll want to cut a hole in the door and turn the lower bezel (J) so you can see the pendulum. Turn this bezel from one piece of hardwood as shown in Figure 4. Note the rabbet in the back of this bezel that serves a glass retainer.

Because you'll be gluing the moulding on the front and sides of the carcase, you'll need to make them so the grain is oriented in the same direction as the carcase so they don't check as the wood expands and contracts. Fabricate the molding by gluing up sections of ¾" stock into the pieces shown in Figure 5. Note that the Figure shows the side moulding pieces for the top and middle but not the bottom. The sides of the bottom moulding strip have the same profile as the bottom front. The front and sides are all mitered together.

Cross–grain material like this is difficult to work because it will break with very little stress. Therefore, you should glue it to the carcase before carving the profile. Bandsaw the upper and middle front pieces to shape using the full–size patterns in the PullOut™ Plans; then glue them to the case and shape them with carving chisels and sandpaper. The the top left photo on page 40 shows the carcase with the rough molding attached and ready to be carved.

The paint and decoration are vital to the success of this clock. I have seen these clocks painted white with gilding, solid red, red with graining to simulate mahogany and in several other colors. The clock decoration shown is a composite of several old clocks.

For the base coat, use the best quality oil paint available applied over a sanded primer coat. Depending on the paint, you may need to apply two base coats. The details should be done in oils or, for easier clean up and quicker drying time, alkyds are a good alternative. After painting, install four steel glides on the base so it does not scratch the floor.

I spent roughly 100 hours, over the course of a few months, to build this clock. These were pleasurable, productive hours and the result will keep beautiful time for generations. PW

A Popular Woodworking Project

WESTERN BOOT JACK

Western Boot Jack

Cutting List

Qty	Part	Rough Size T	W	L	Piece
8	A	3/4"	1"	15"	top strips
1	B	3/4"	7"	3"	support

by Devore O. Burch

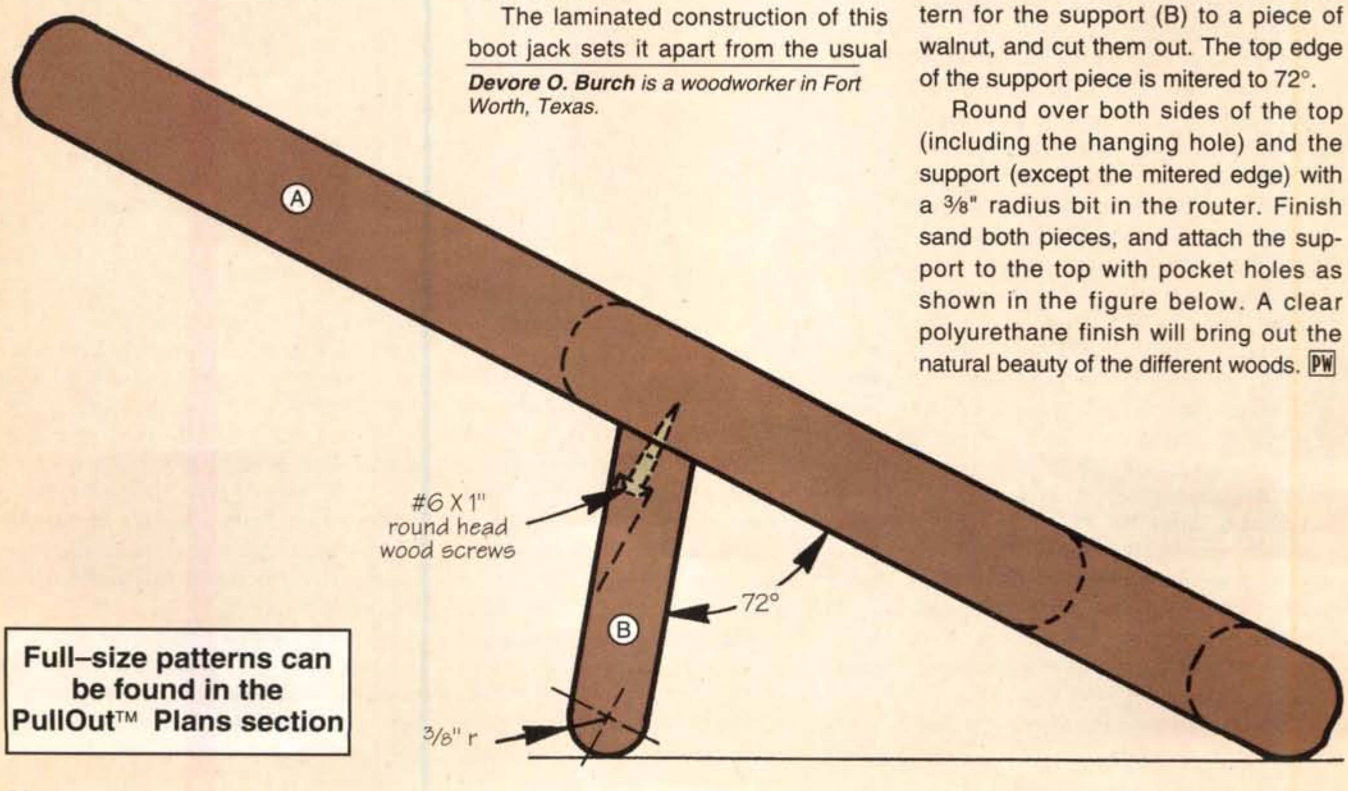
Western clothing is not only popular in the United States, but also in such far-flung places as Hong Kong and London. Wherever you call home, you need a place to hang your Stetson and a way to get your boots off. The boot jack is the perfect solution to the chore of boot removal.

The laminated construction of this boot jack sets it apart from the usual flat board design. Use alternating strips of black walnut and aromatic red cedar for a jack as pretty as a moonlit mesa.

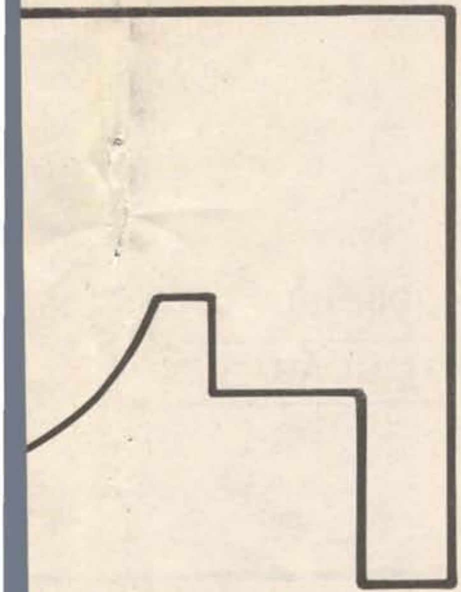
***Devore O. Burch** is a woodworker in Fort Worth, Texas.*

First, cut the top strips (A) to size as given in the Cutting List. Glue the strips together, and when dry, sand the assembly so it's flat *on either side*. Transfer the full-size pattern from the PullOut™ Plans to the top and the pattern for the support (B) to a piece of walnut, and cut them out. The top edge of the support piece is mitered to 72°.

Round over both sides of the top (including the hanging hole) and the support (except the mitered edge) with a 3/8" radius bit in the router. Finish sand both pieces, and attach the support to the top with pocket holes as shown in the figure below. A clear polyurethane finish will bring out the natural beauty of the different woods. PW

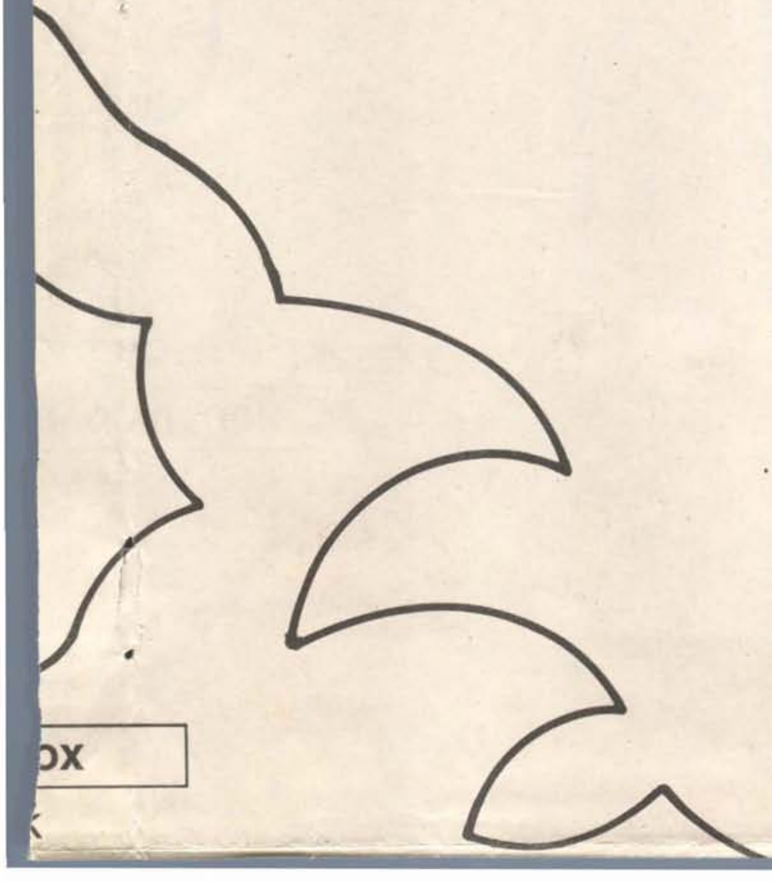


Full–size patterns can be found in the PullOut™ Plans section



Popular Woodworking No. 70

PullOut™ Plans



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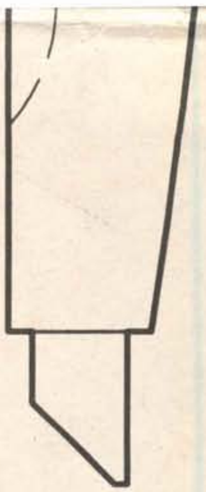
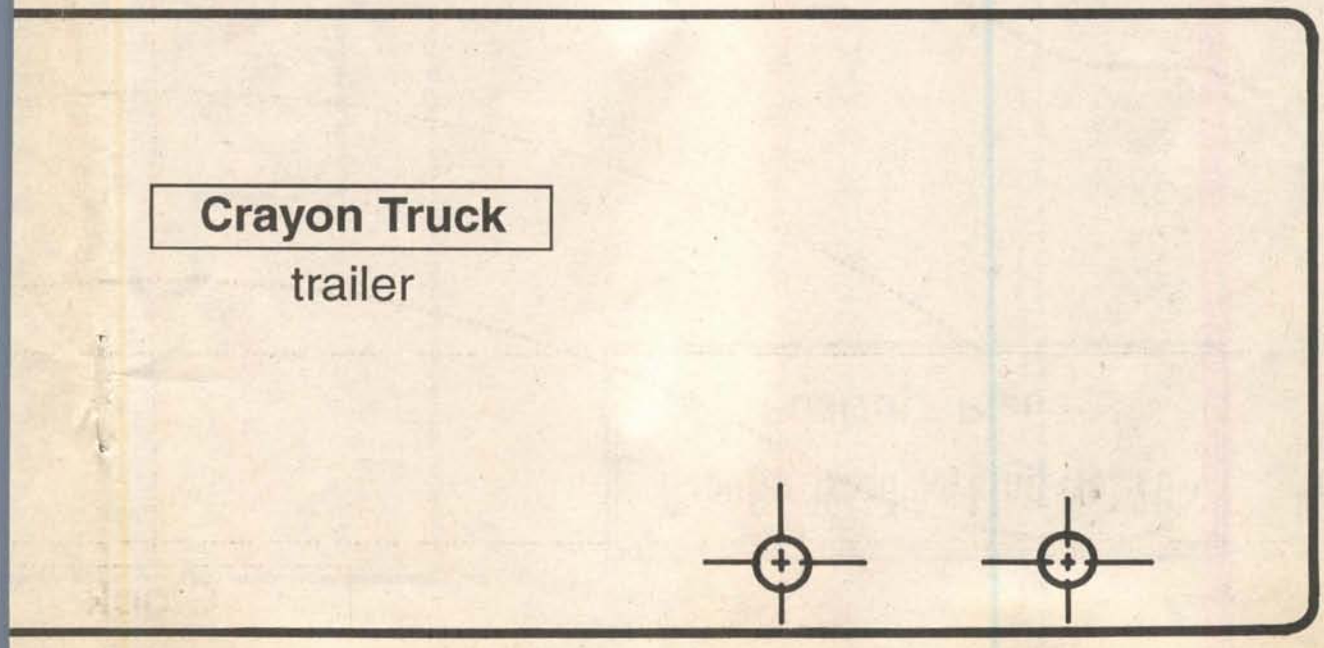
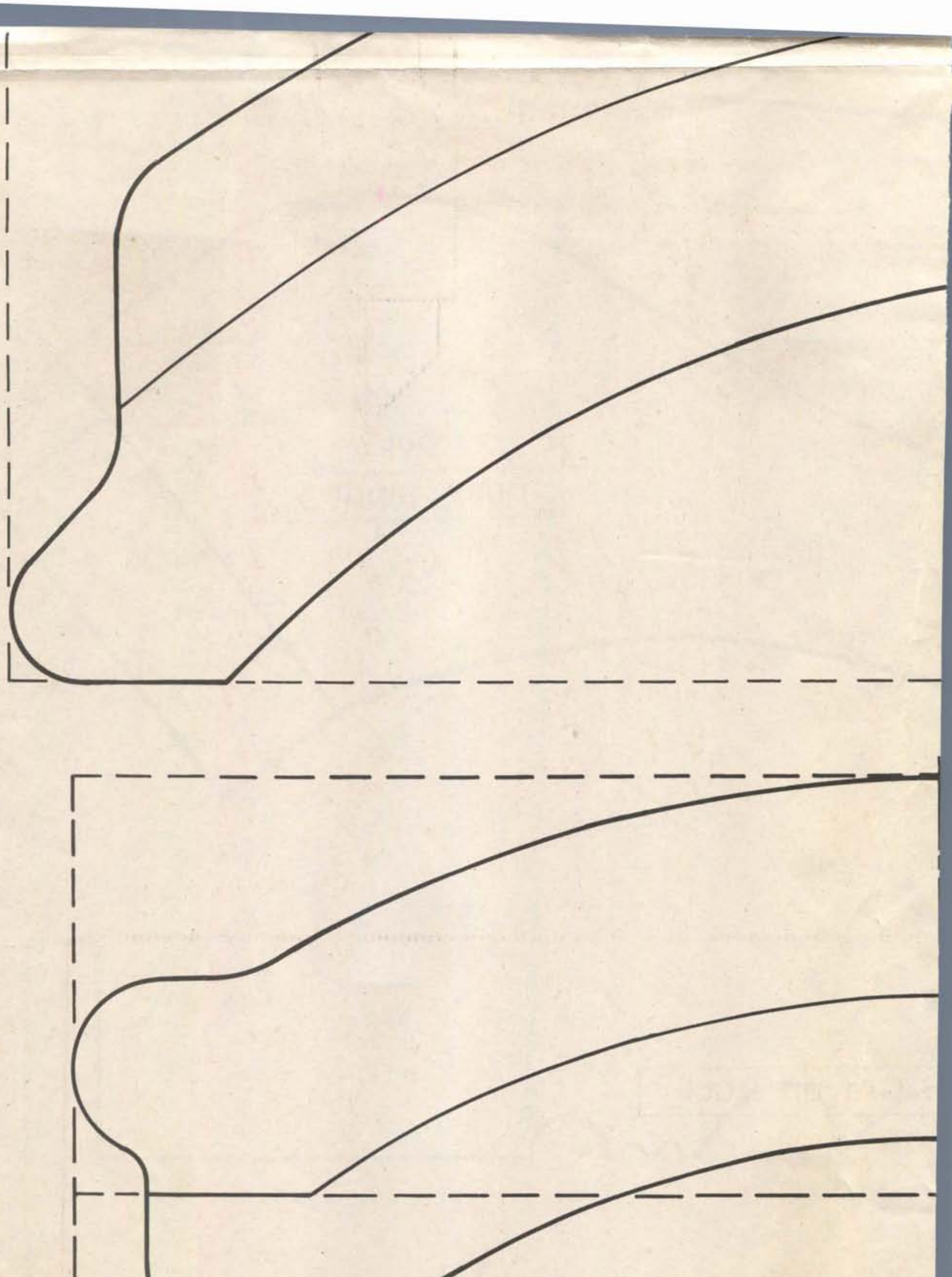
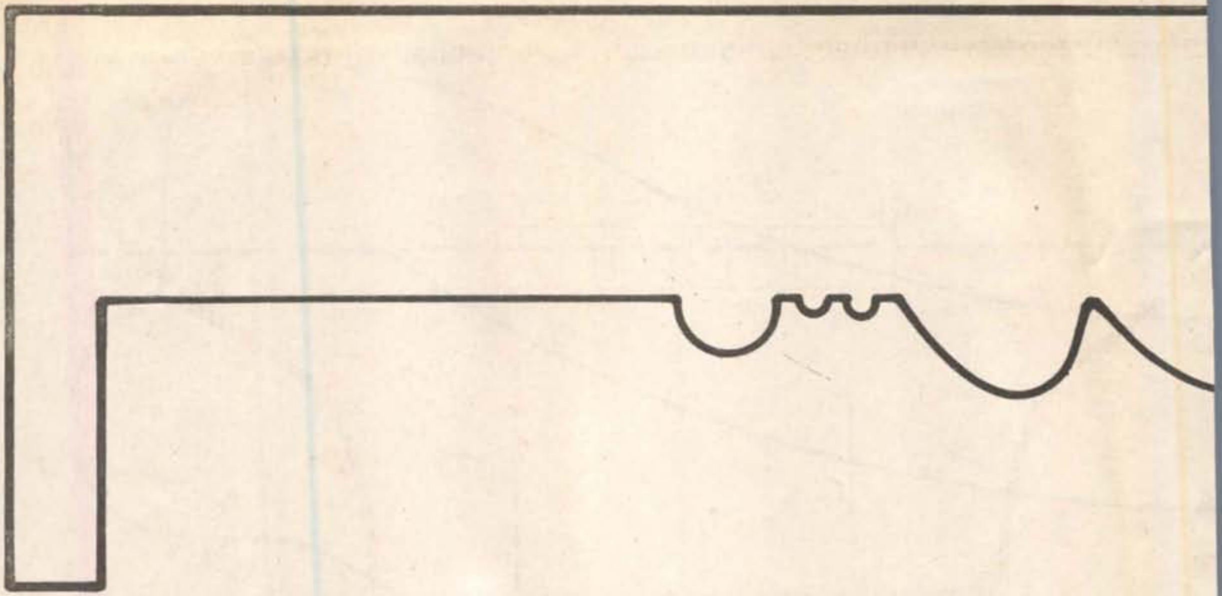
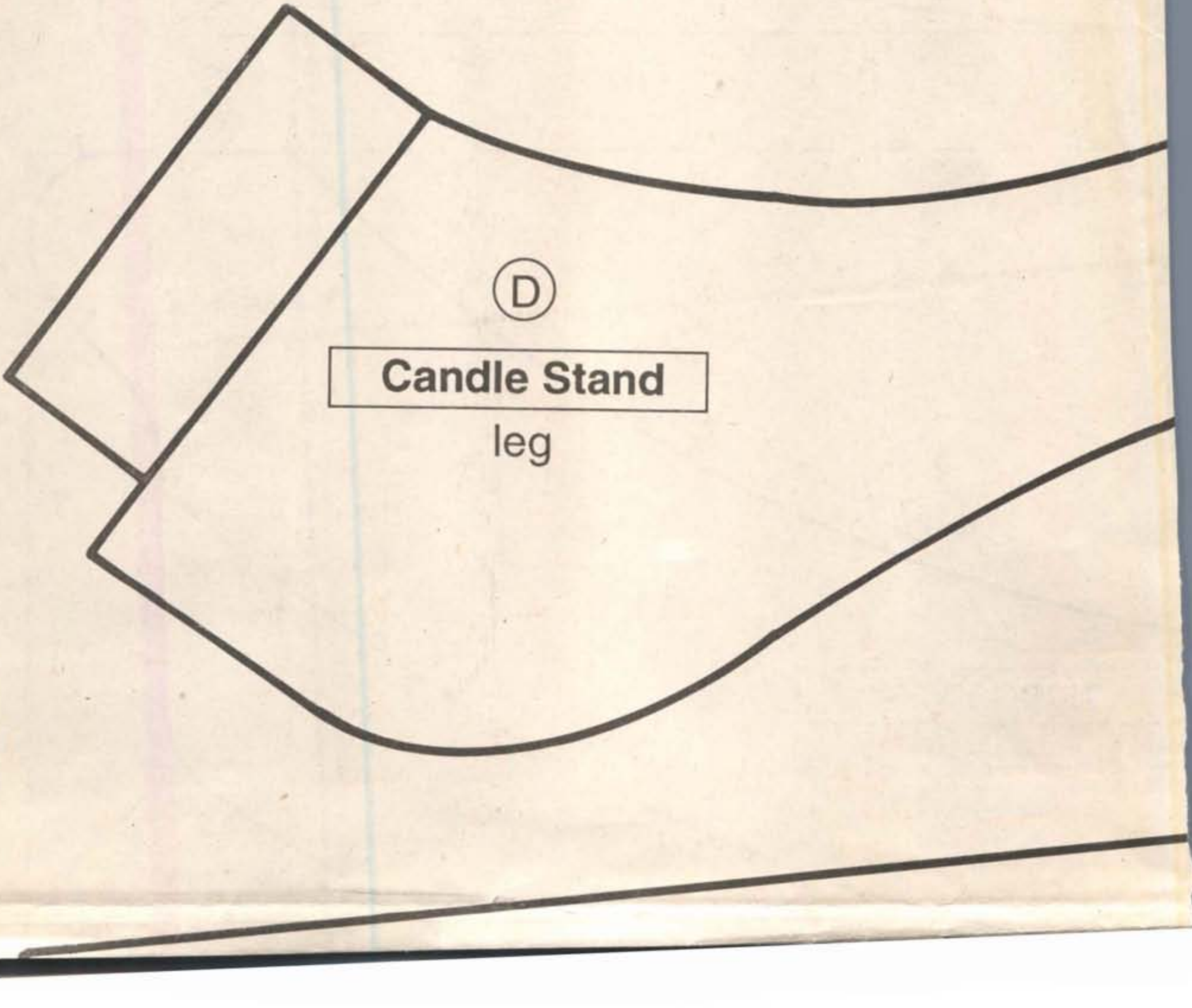


ayon Truck
cab


Crayon Truck
trailer


Cl
top m




D
Candle Stand
leg

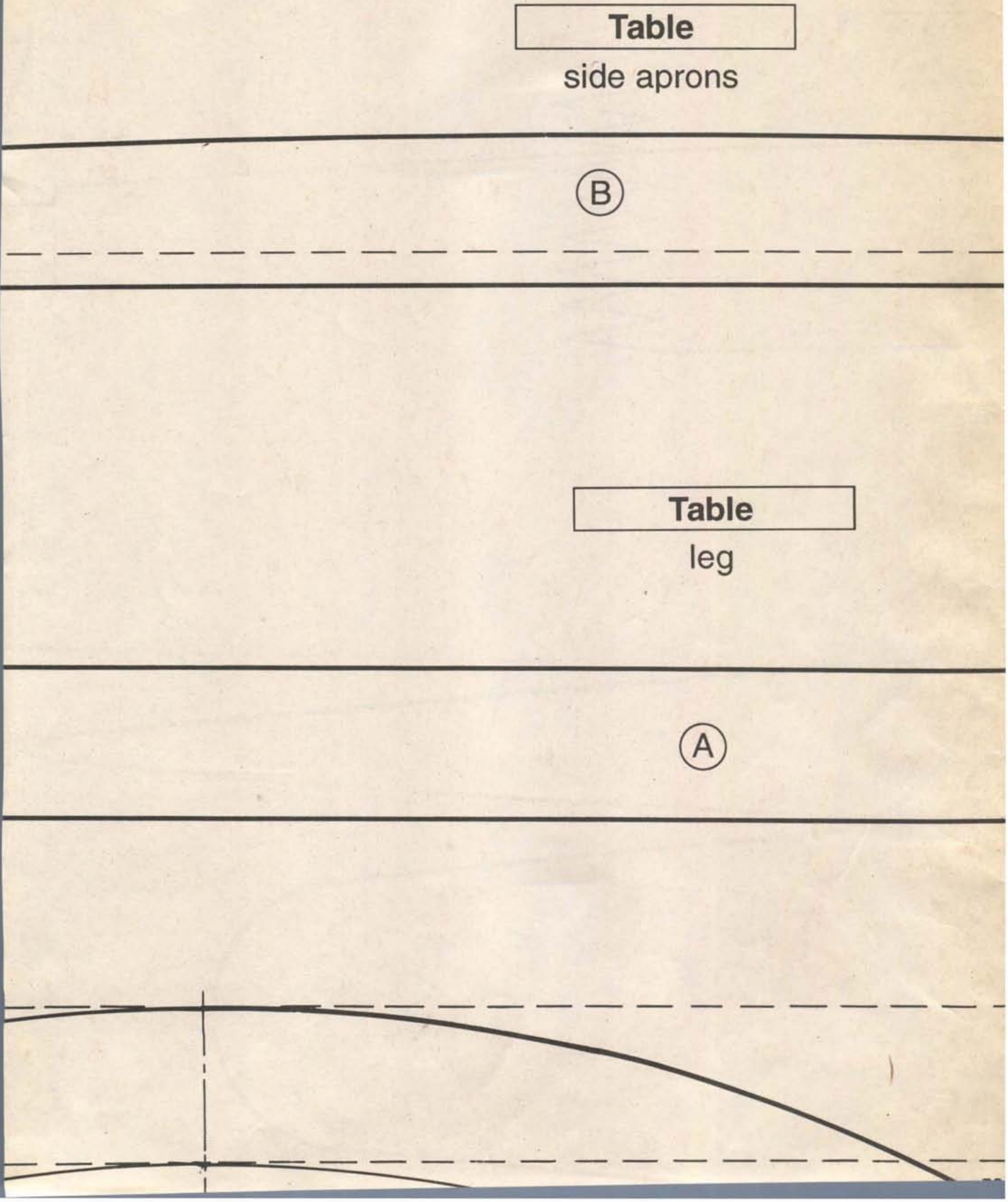
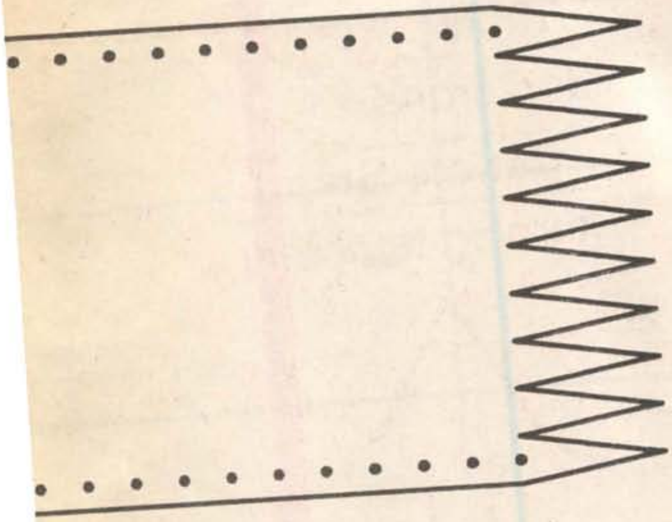


Table
side aprons
B
Table
leg
A



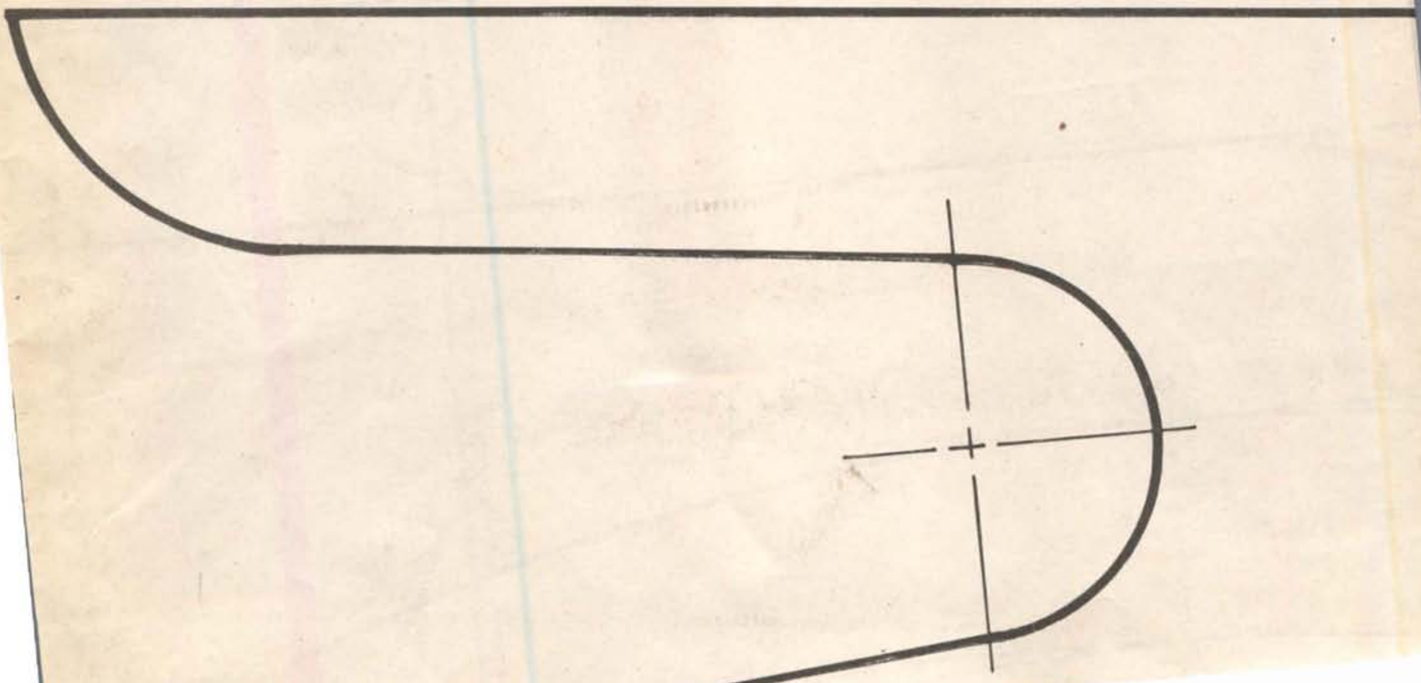
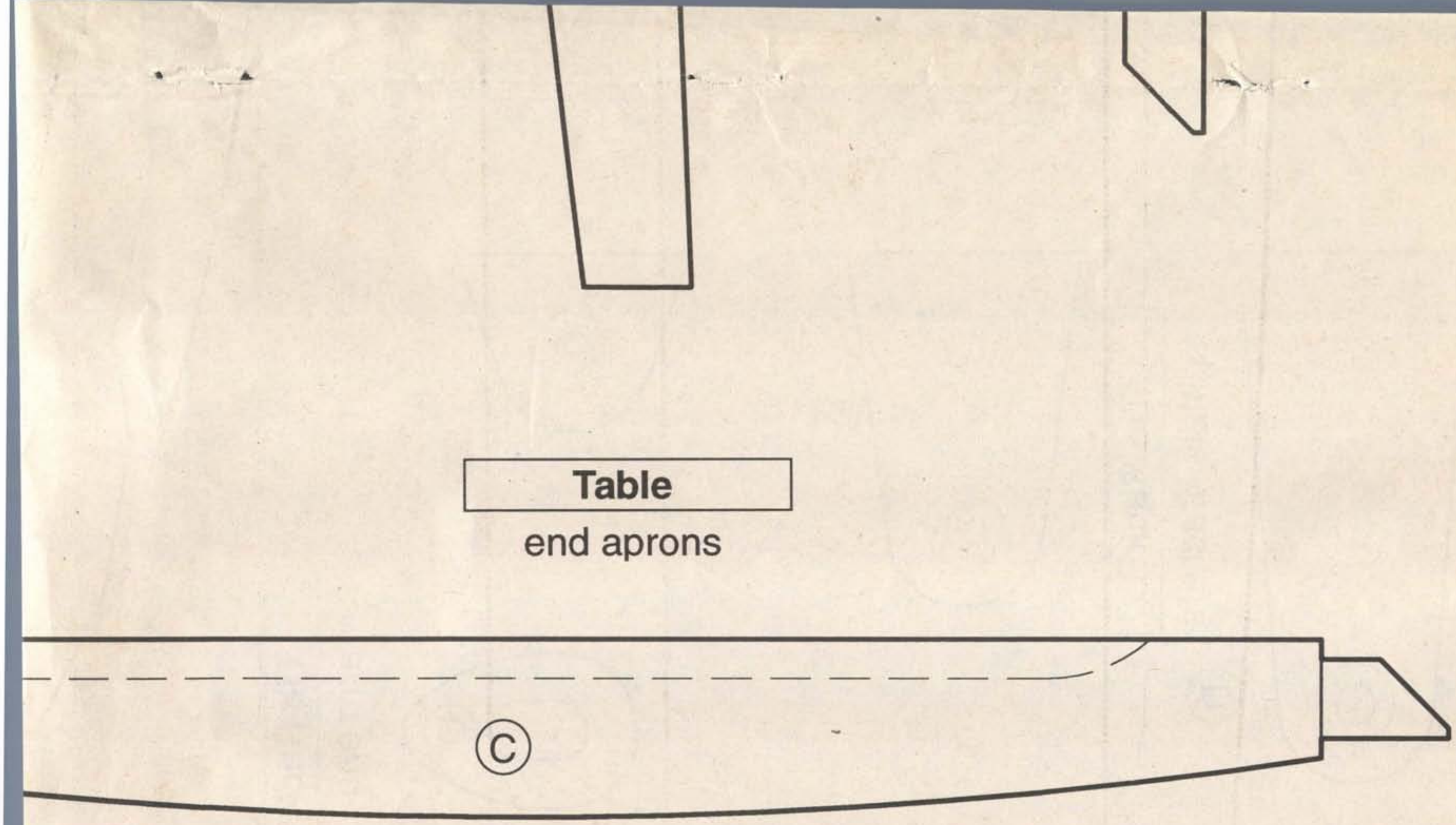
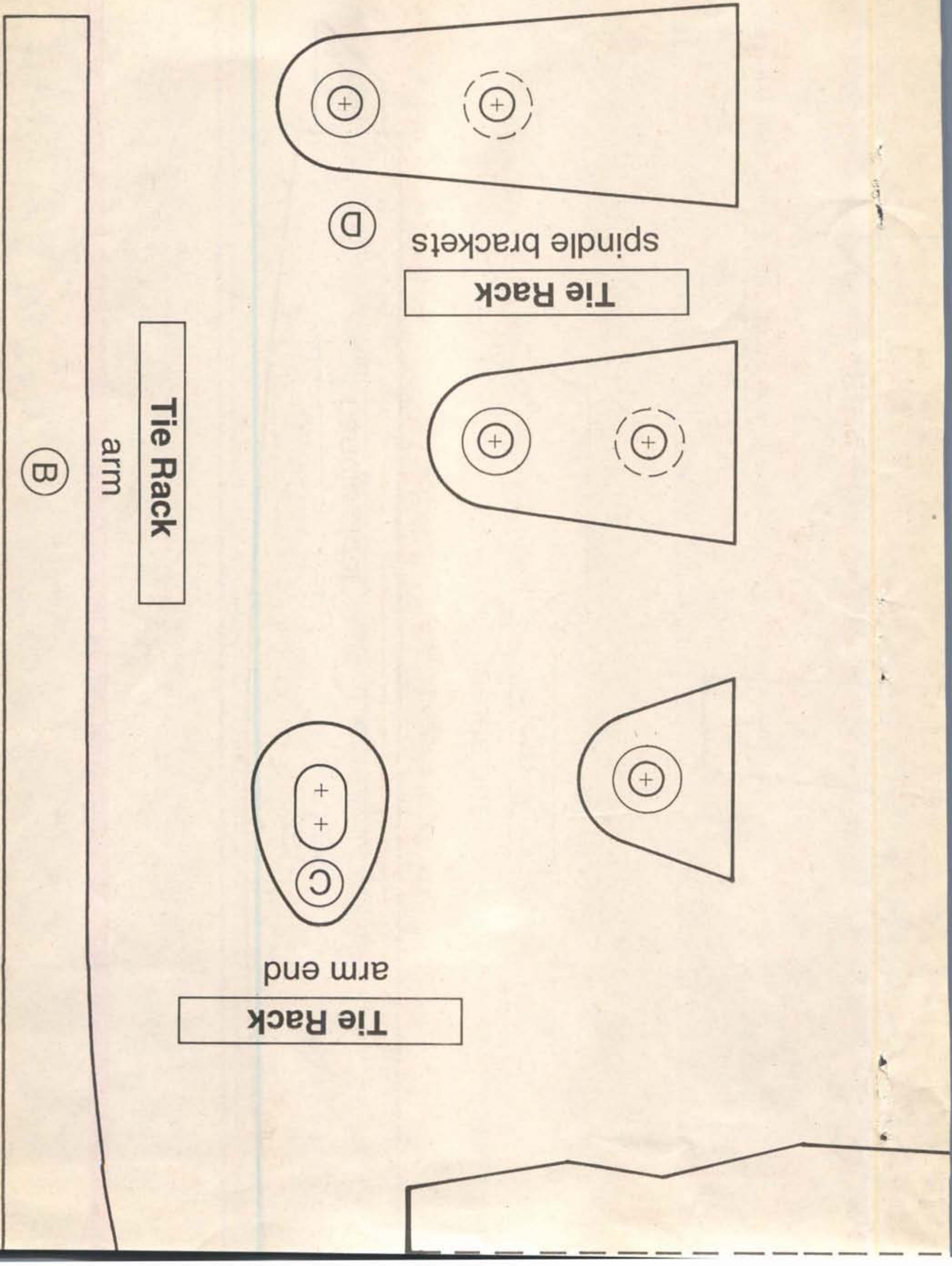
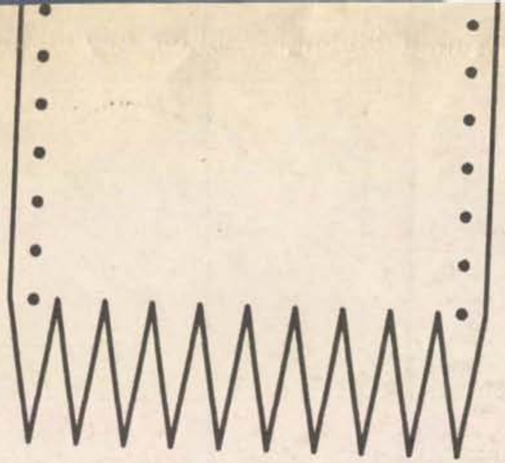


Table
end aprons

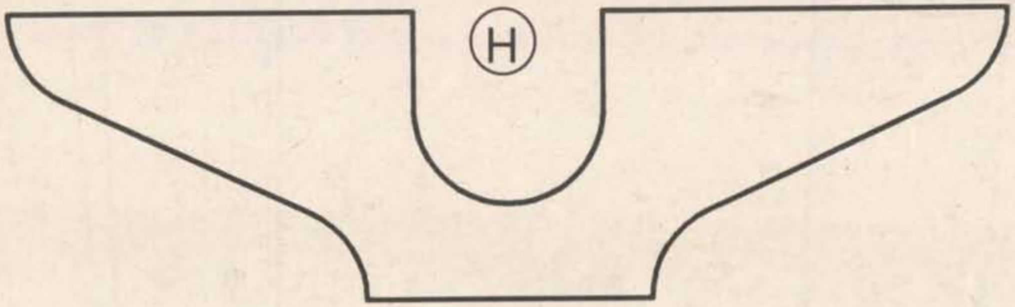


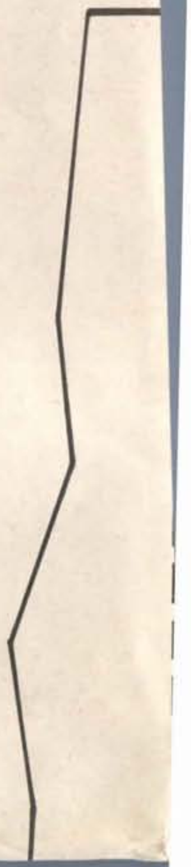

Tie Rack
spindle brackets
D
Tie Rack
arm
B
Tie Rack
arm end
C



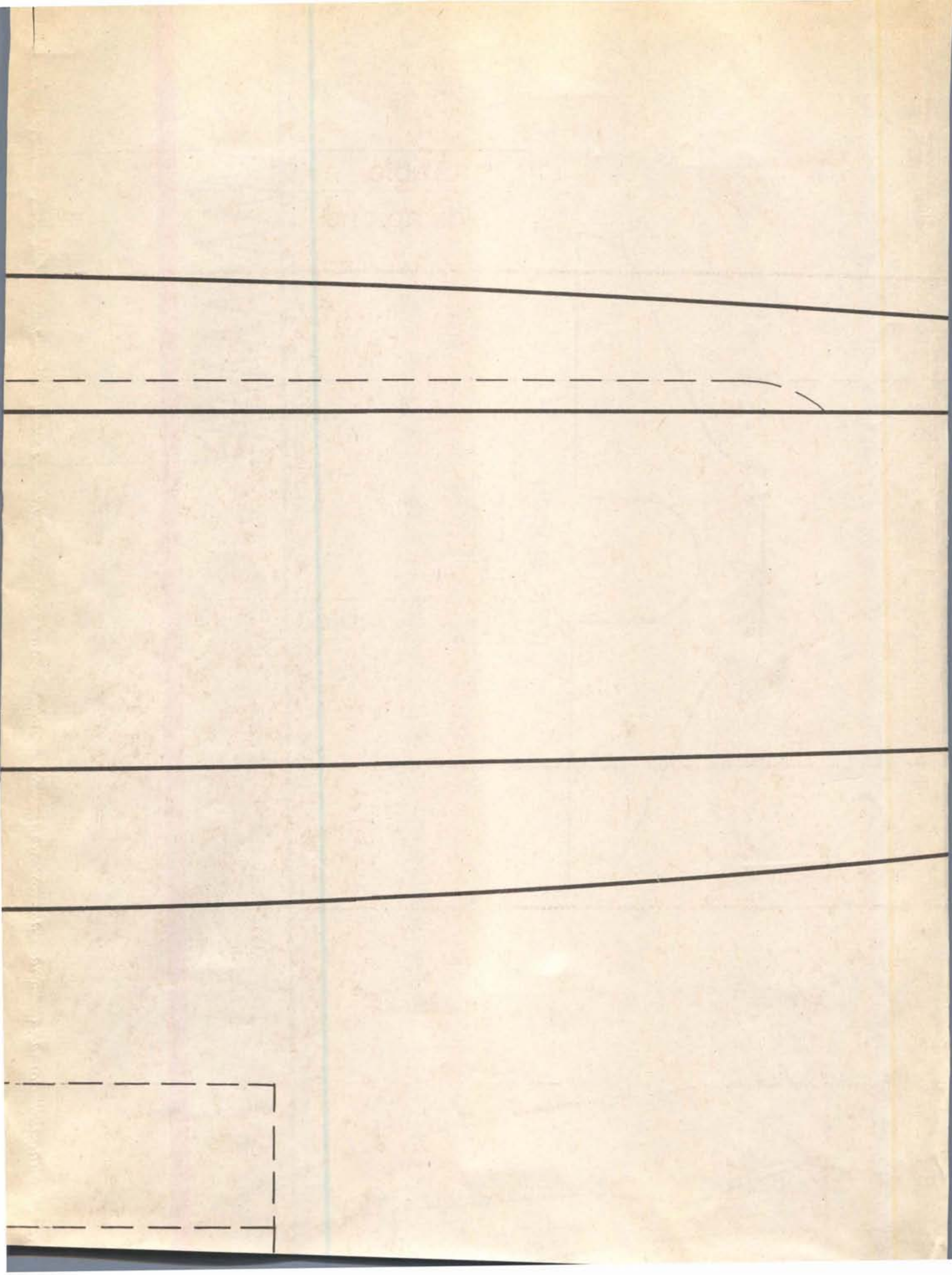
Sea Chest

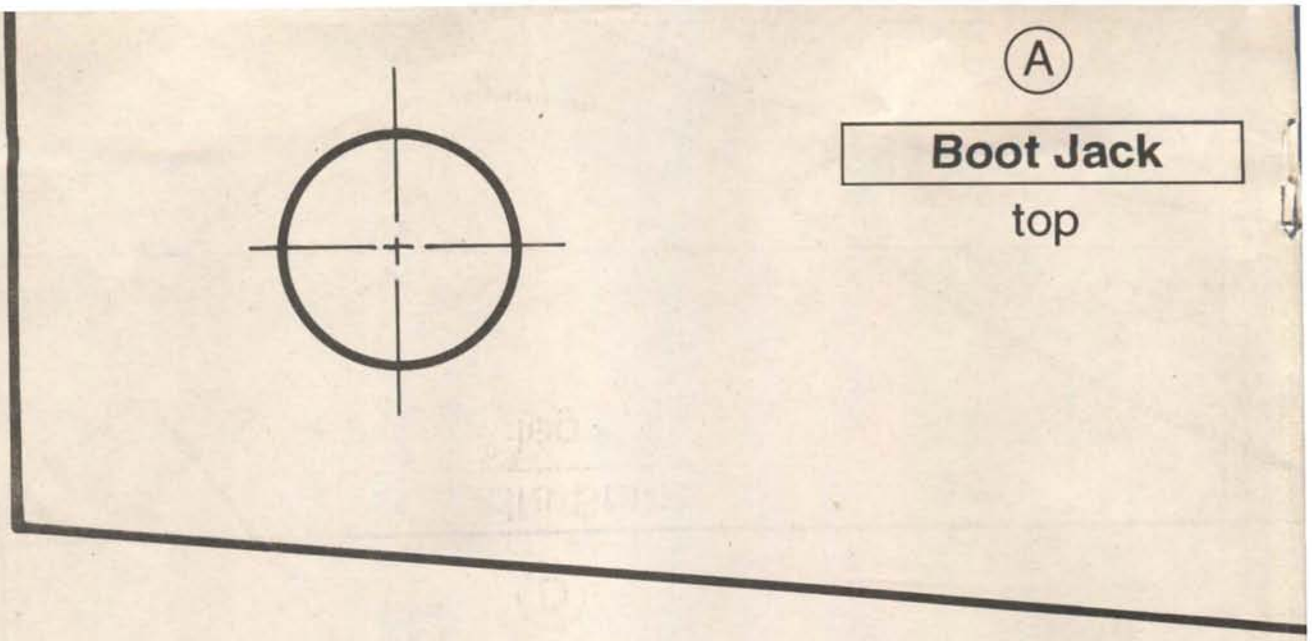
handle cleat

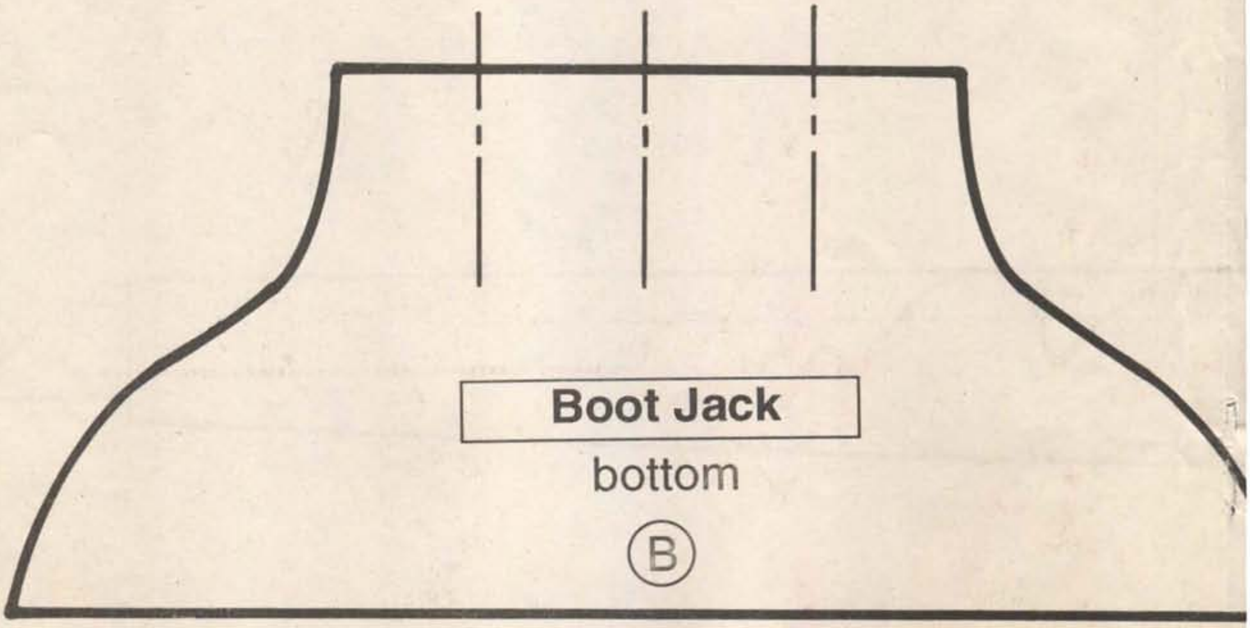


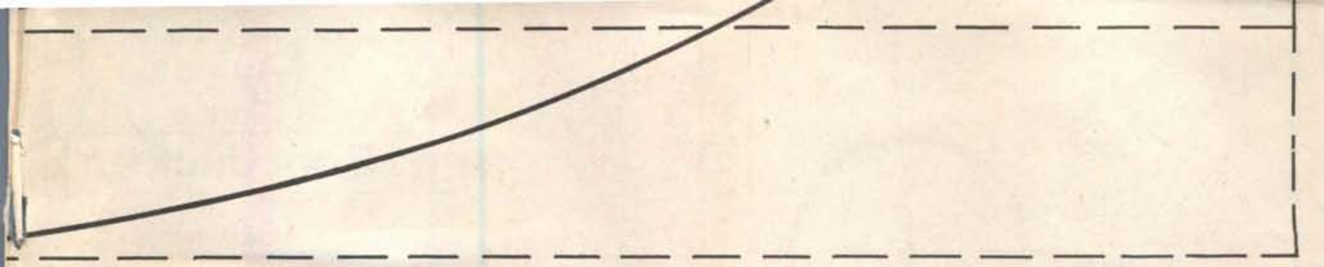


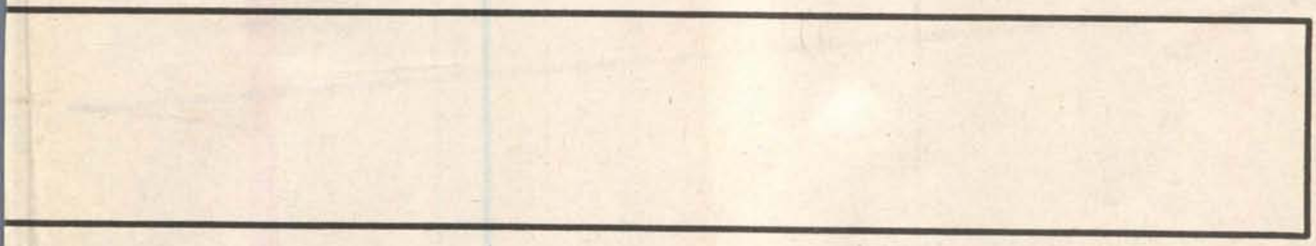
Carefully open staples to remove plans, then bend them closed again.

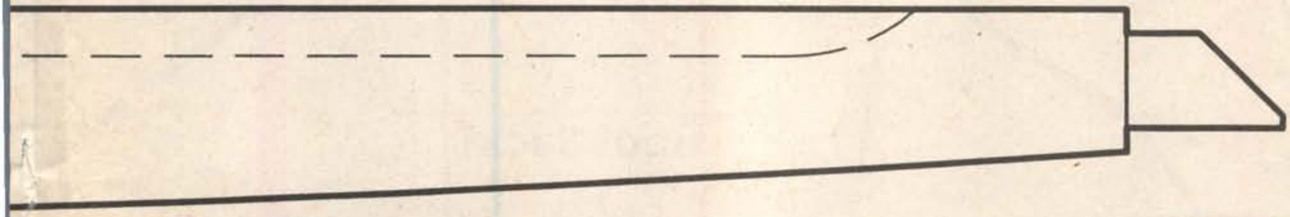



A
Boot Jack
top


Boot Jack
bottom
B



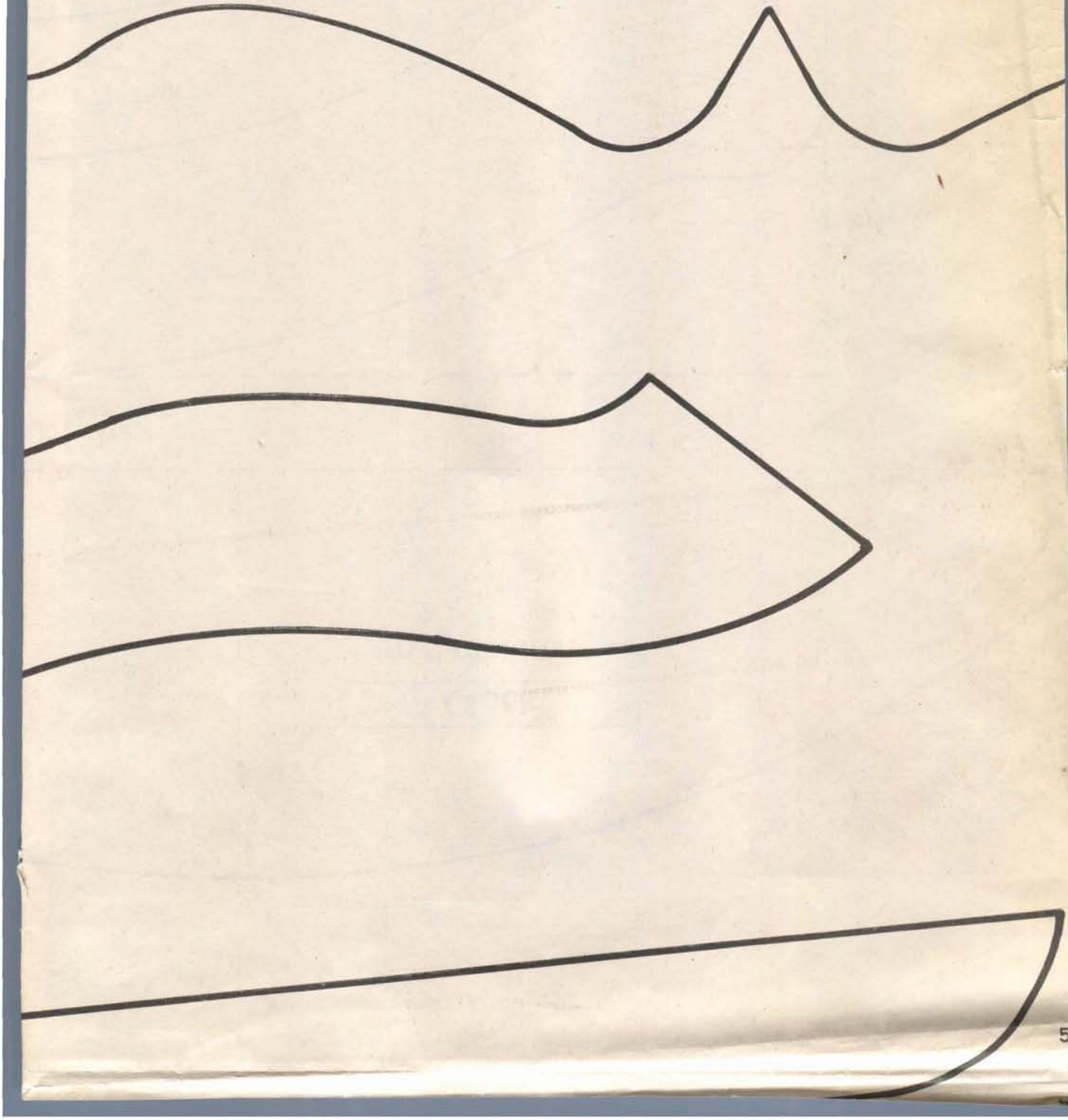


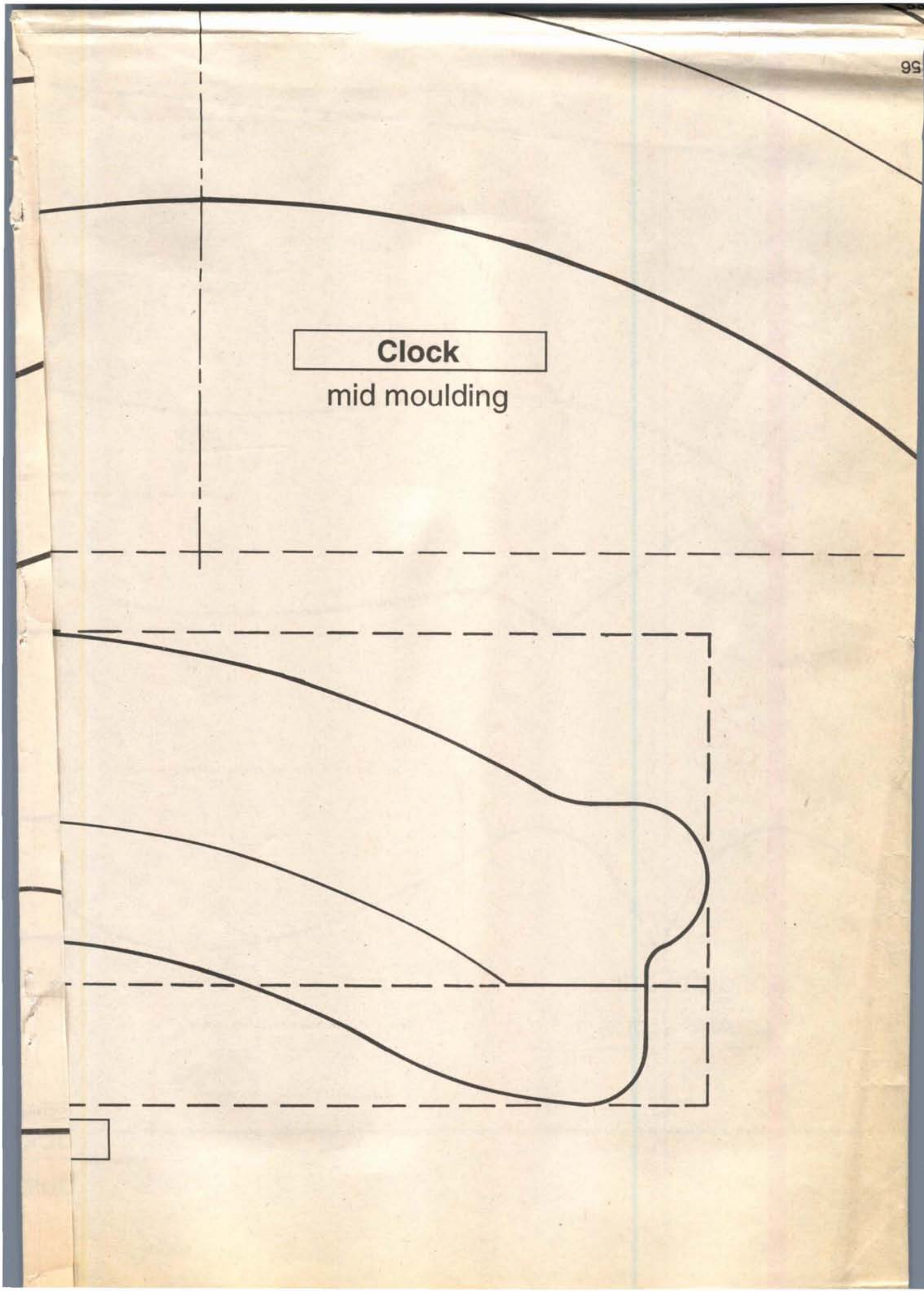


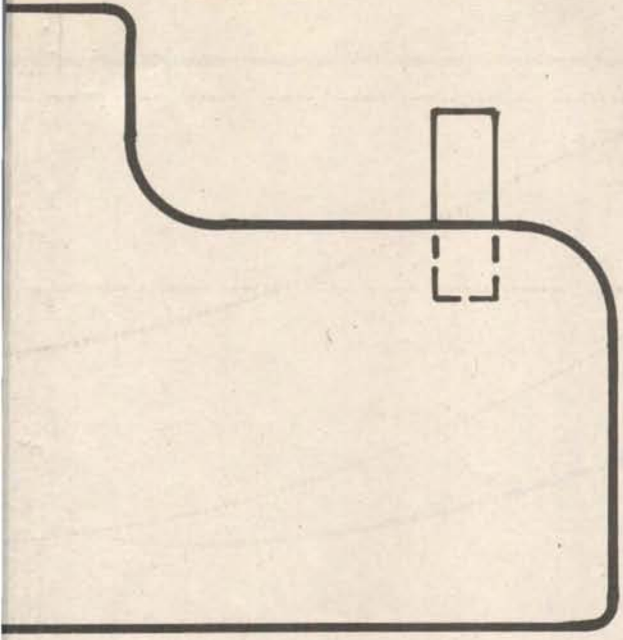
Ⓒ

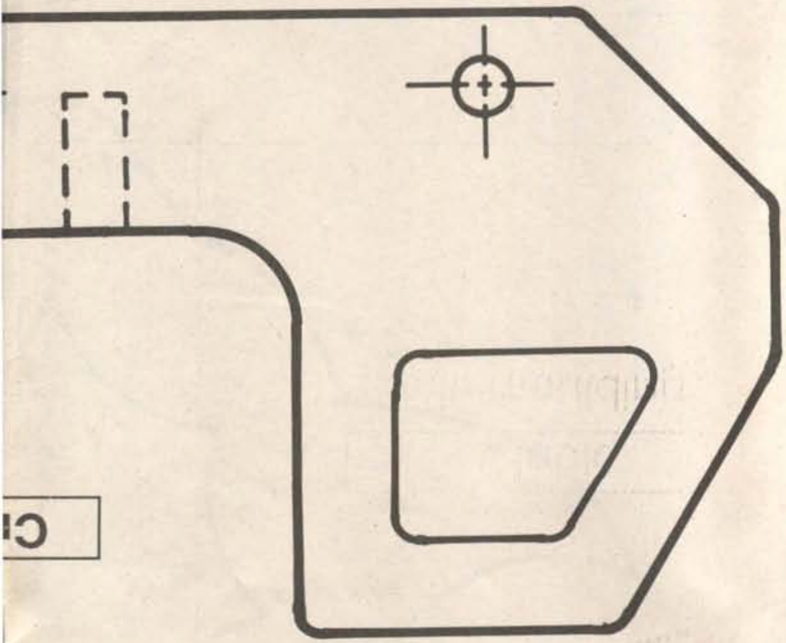
Candle Stand

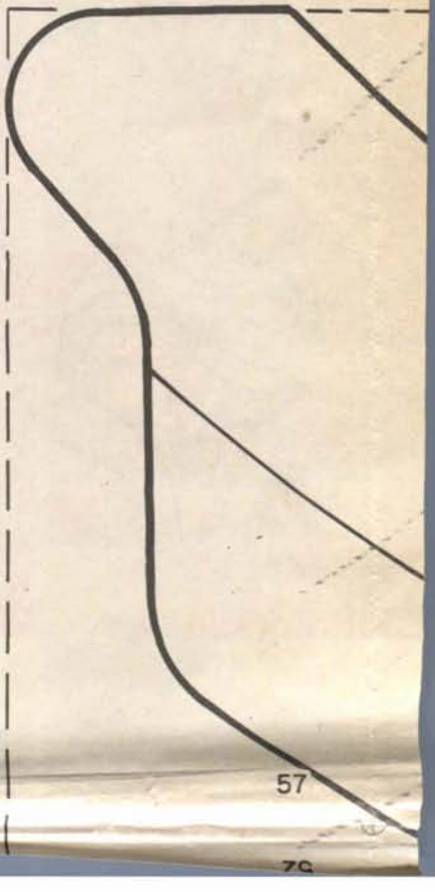
turning template



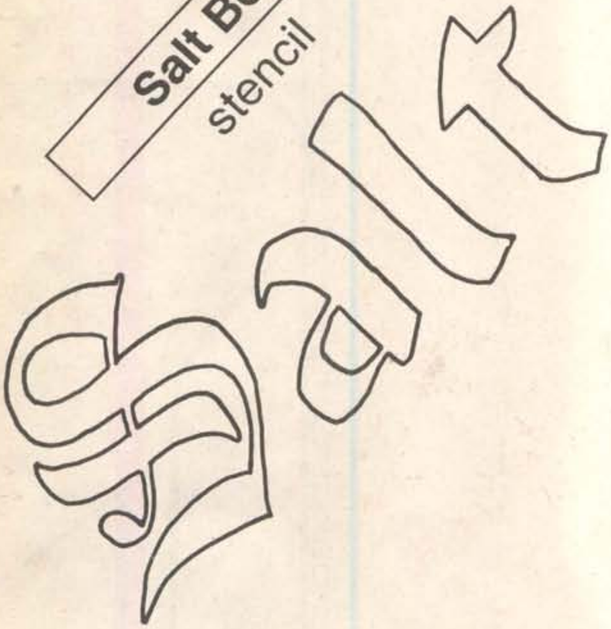

Clock
mid moulding

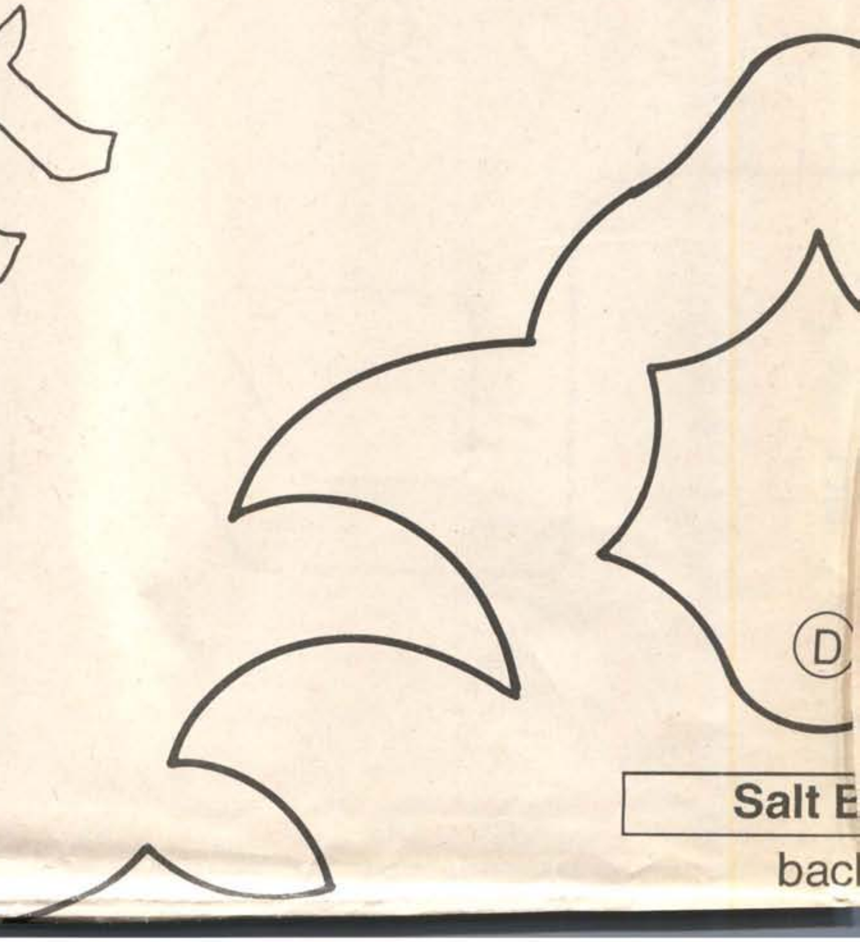



C



Salt Box
stencil

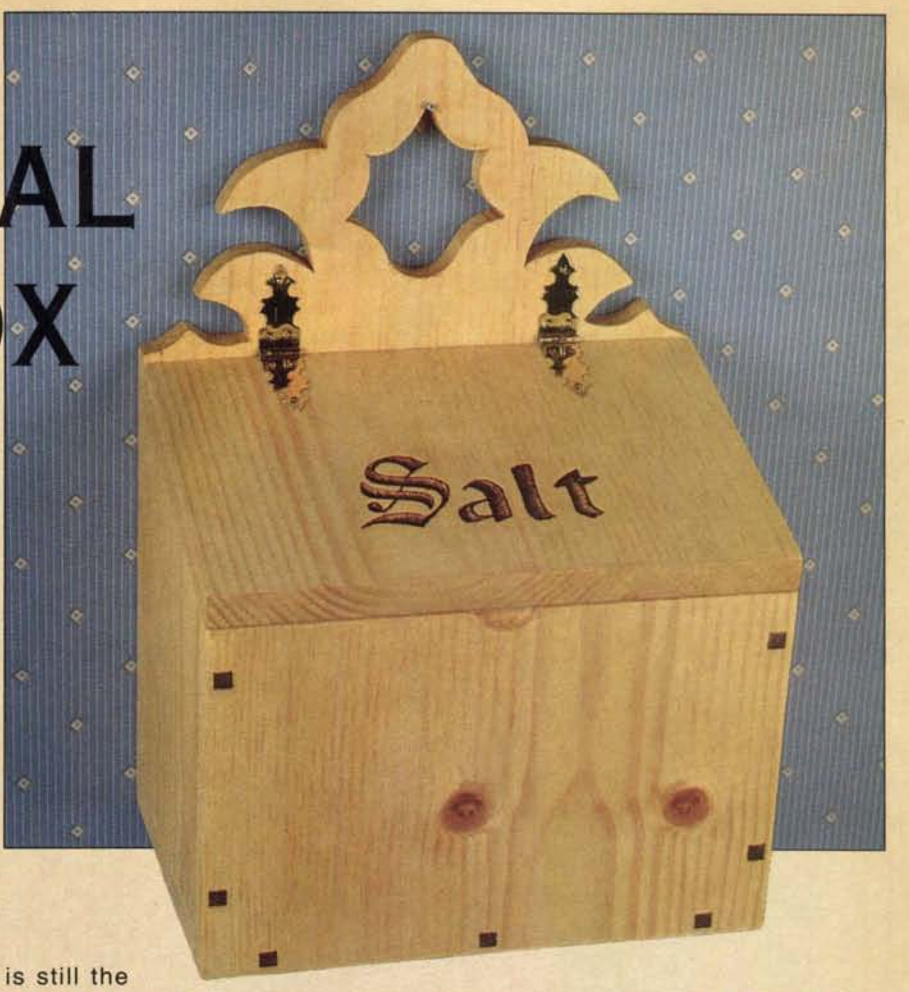




Salt B
bac

A Popular Woodworking Project

COLONIAL SALTBOX



by Robert Elmore

In colonial times, salt was a precious commodity as highly valued as tea, sugar, and other spices. Salt was the only means people had for preserving meat and vegetables; it was usually purchased in lumps or rocks and stored in a kitchen saltbox.

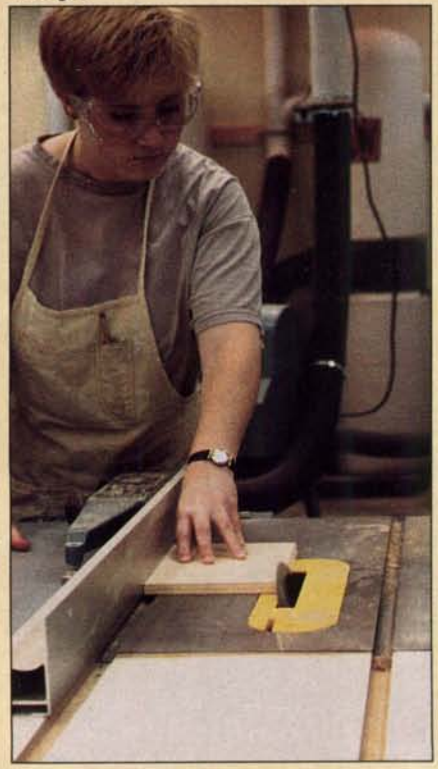
This saltbox has been remodeled from an antique. I deepened the box to hold two round salt containers, but it can be used to hold other kitchen spices as well. I covered the nails with square, hardwood plugs to preserve the antique feeling. Modern hinges replace the fence staples used on the original, but the basic design of the box is still the same, making it an interesting kitchen accessory. I made my saltbox from white pine, like its ancestor. With a little care you can obtain all the pieces from a small plank, avoiding knots—unless, like me, you think knots lend character to wood.

***Robert Elmore** is a dedicated woodworker and freelance writer from Richmond Hill, Georgia.*

Start by cutting all the parts to the sizes given in the Cutting List. Tilt the table saw blade to 15° to cut the bevels on the front and back of the lid (A), and the top edge of the front (B) (**see the diagram on page 60**). Reset the blade to 0°, and set the miter gauge to 15° to cut the tops of the sides (C). Masking tape the sides together, and cut both at the same time so they match.

Transfer the full–size pattern from the PullOut™ Plans to the back (D). Use a 1" Forstner bit to drill out the bottom arc for the center hole. Feed the scroll saw blade through this hole to cut the rest of the inside pattern. Reset the blade and saw the rest of the pattern.

Pencil in the locations of the seven



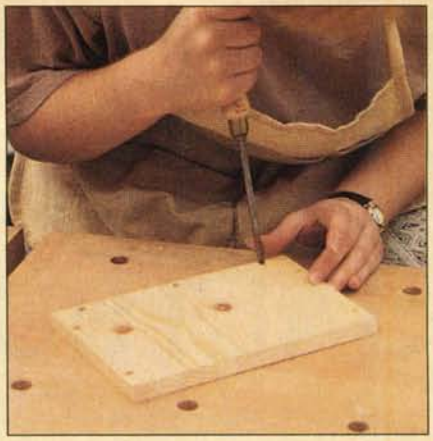
Set the table saw blade to 15° and cut the beveled edges to the finished dimensions specified in the diagram on page 60.

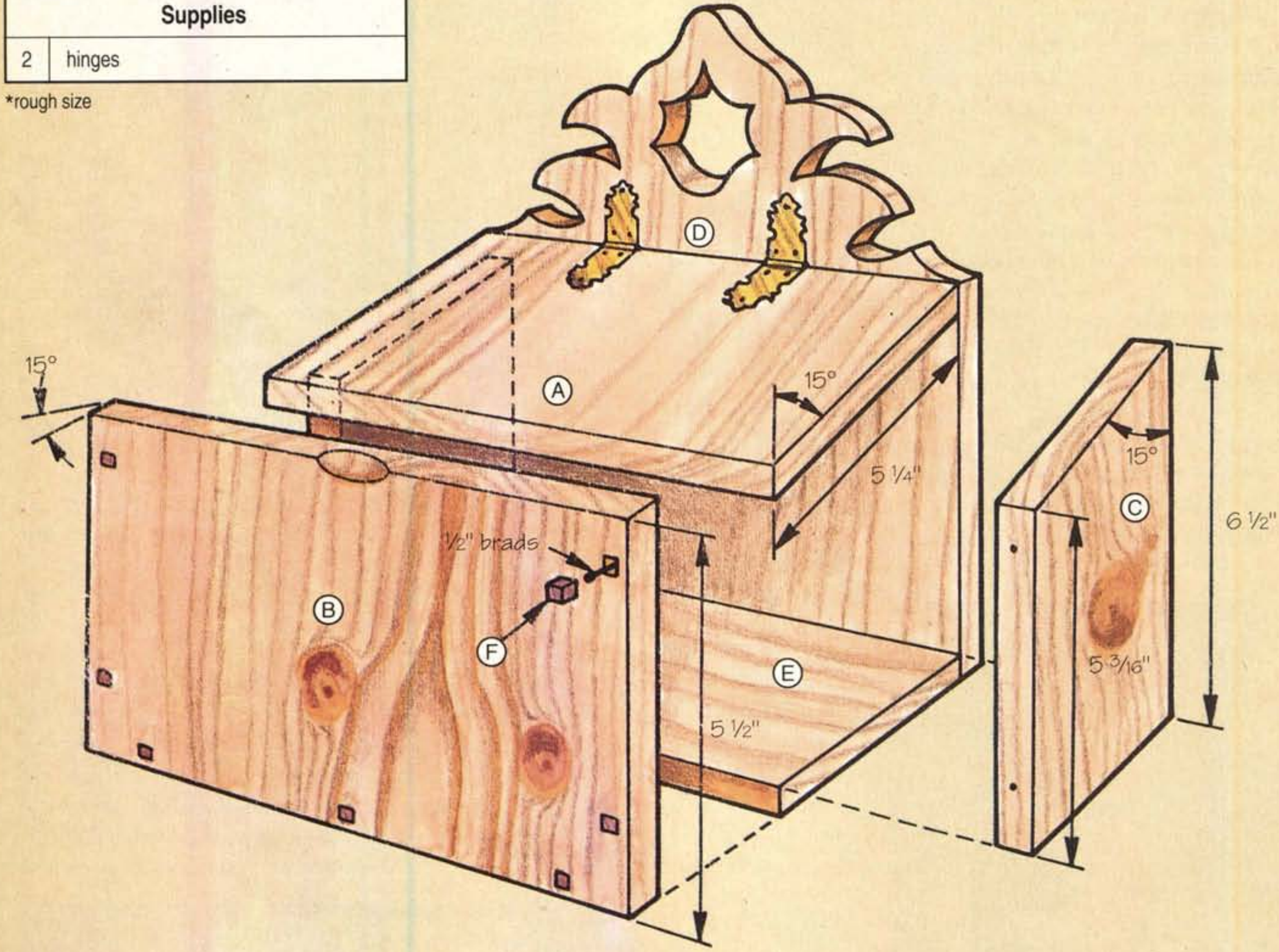
Feed the scroll saw blade through a hole to cut out the inside of the back pattern. Use a 1" Forstner bit to drill the hole and line it up with the bottom arc.

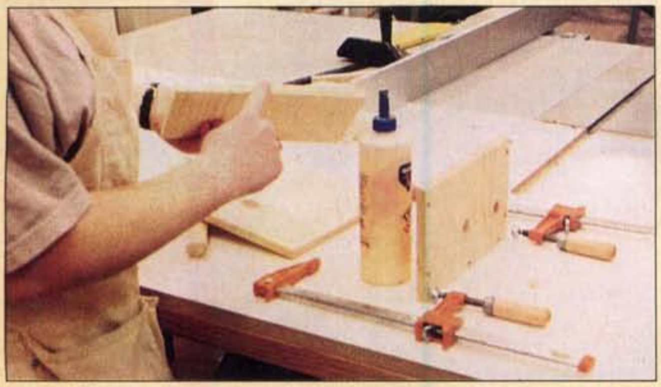
Colonial Saltbox					
Cutting List					
		Finished Size			
Qty	Part	T	W	L	Piece
1	A	½"	8½"	5¾"*	lid
1	B	½"	8½"	5¾"*	front
2	C	½"	4½"	6¾"*	sides
1	D	½"	8½"	12⅜"	back
1	E	½"	8½"	4¼"	bottom
7	F	¼"	¼"	5⁄16"*	plugs
Supplies					
2	hinges				

*rough size

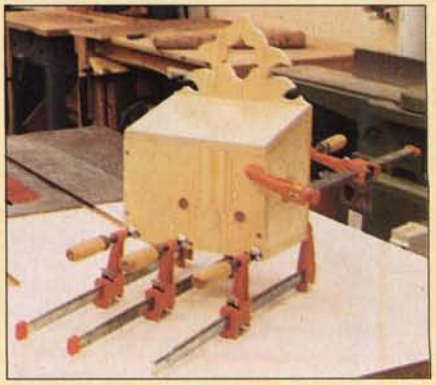
Drill the seven peg holes to a depth of ¼", about ¼" from the edge of the wood. Square them out with a ¼" chisel.

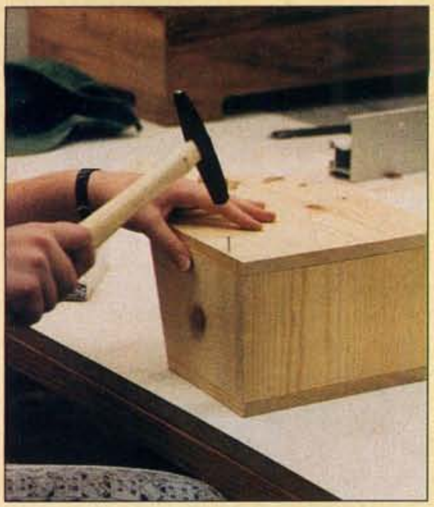




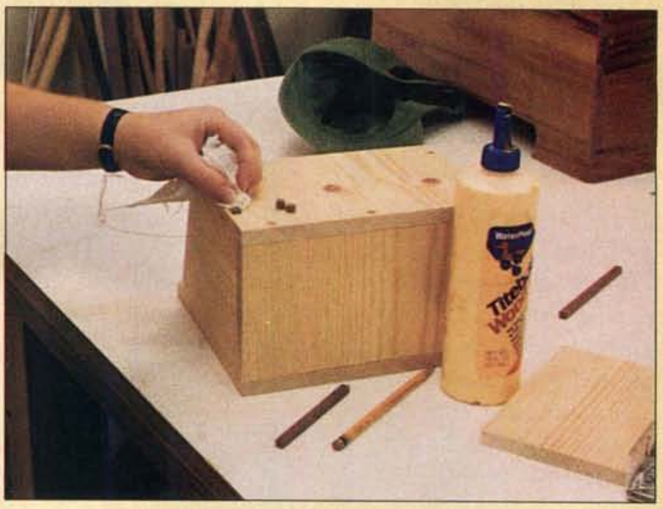


Before gluing, dry fit the parts to ensure a snug fit. Sand if necessary. Glue and clamp the back and front to the bottom, then slip in the sides. Secure the clamps tight enough so the glue flows out of the cracks, but be careful not to mar the pine.





After the glue has set, drive several ½" brads into the back to hold the side and bottom joints. On the front, use a nail punch to drive the brads down into the chiseled holes.



Cut the plug roughs from a stick of ¼" X ¼" stock. Glue and hammer the plugs into the holes, covering the brad heads, then sand the plugs flush with the front.

square pegs on the front as indicated in the diagram. Drill a ¼" hole in the center of the squares to a depth of ¼". Chisel the holes square with a ¼" chisel.

Dry fit all the parts before attempting to assemble the project. If any part does not fit perfectly, make the necessary corrections at this time.

Glue and clamp the back and front to the bottom (E). Glue the sides between the back and front so they fit against the bottom. Use a nail punch to set ¾" brads through the square holes into the sides. Drive several brads through the back to hold the glue joints in the bottom and sides closed.

Cut a piece of ¼" X ¼" walnut stock 6" long, and use a scroll or coping saw to cut this stock into 5⁄16" pieces for the plugs (F). Put a little glue on the plugs and push them into the square holes to cover the nail heads. Tap them gently into place and sand them flush with the front. Use a shallow gouge to carve a ⅜" half–circle thumb depression in the center of the top of the front.

Starting with 150–grit paper, sand all of the parts through 220–grit. If you intend to fill the saltbox with salt, give the pine a coat of stain and protect the inside with three coats of water–based polyurethane. This saltbox was finished with Golden Oak Briwax™ for a country style kitchen.

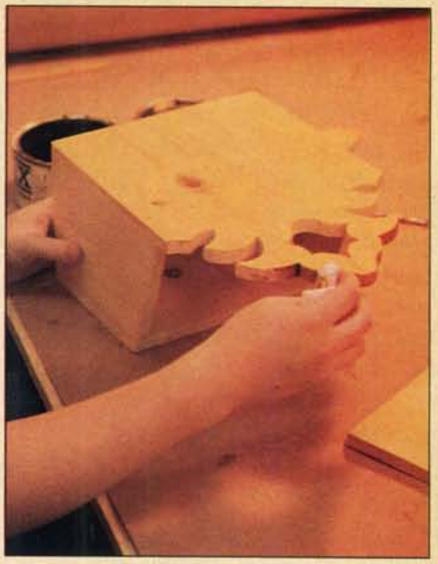
Center the lid on the box and mark the position for the hinges. Mount the hinges with the hinge pins on the outside of the lid and back.

Transfer the "Salt" stencil from the PullOut™ Plans to the center of the lid 1" from the bottom. Use sewing transfer paper, or rub chalk or graphite on the back of the stencil and trace the lettering outline on the lid. Paint or woodburn the letters on the wood. Two boxes of salt weigh over three pounds, so hang the saltbox with a strong fastener. PW

Carve out the thumb depression with a ⅜" gouge.

Once the finish has dried, attach the hinges. Hammer the pins in carefully to avoid denting the hinges.

Apply your finish before attaching the lid. This saltbox was finished with Golden Oak Briwax.™

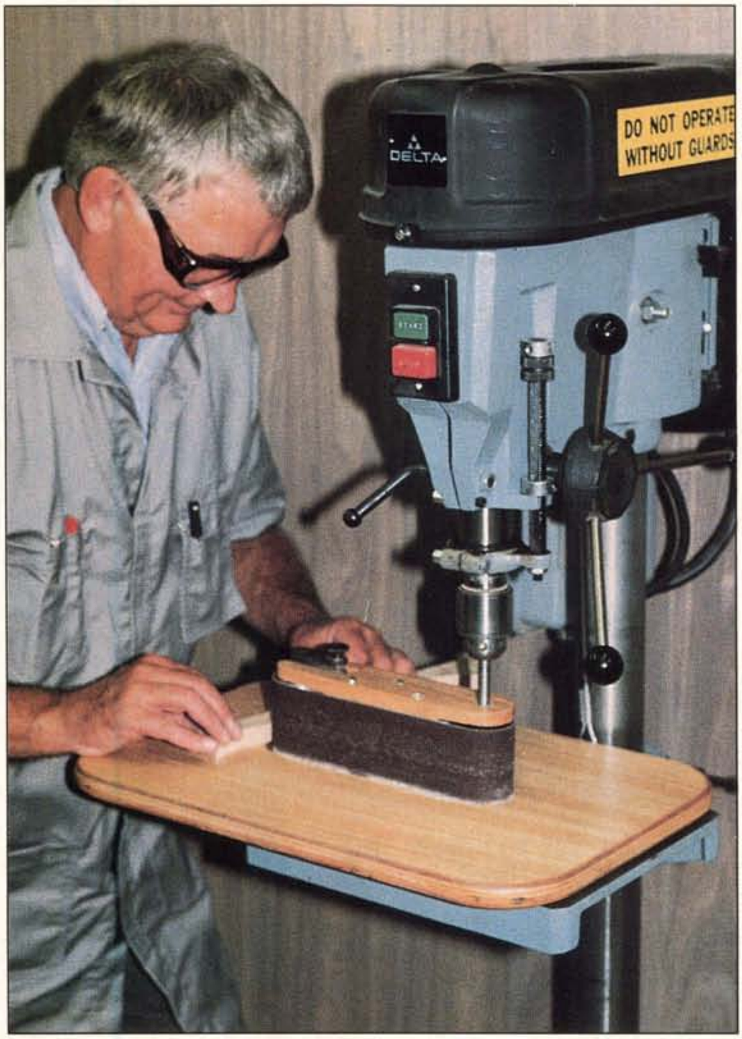


Finish off the saltbox using the salt stencil from the PullOut™ Plans. We used a woodburner to set the letters in the wood. It can be painted on as well, but remember to use an oil-based paint on a waxy finish.

TWIN SPINDLE SANDER

by Dick Dorn

Over twenty years ago, I designed and constructed a twin spindle sanding attachment for a drill press to sand the edges of irregular curves. A cast and machined aluminum framework housed a large rubber–covered drive spindle and a smaller idler spindle located at the opposite end of the frame. The axle of the drive spindle extended upwards and clamped in the drill press chuck. The device utilized a standard-sized sanding belt encircling the frame and the smooth-rotating twin spindles, four sealed ball bearings used in conjunction with the twin spindles, a belt tension and release mechanism, and a belt tracking adjustment. All of the parts, with the exception of the bearings and axle, were produced in our high school shops. It was a smooth, economical, and reliable tool, plus we didn't have to contend with the noise of a small motorized sander. The continuous running belt lasted substantially longer than numerous sanding sleeves and did not burn, score or clog.



The sealed bearings on the sanding attachment finally began to fail last spring. When I attempted to remove the bearings, I cracked the aluminum frame and our twin spindle sanding attachment had to be discarded. I didn't look forward to the work that would be necessary to make another sander of similar quality.

Quick And Easy Replacement

I had a belt sander that was due to be discarded after many years of service and I usually salvage any parts that could serve a future need such as cords, bearings, and brushes. Since I was thinking in terms of a replacement for the twin spindle sanding attachment, I decided to remove the rubber covered drive pulley and the front idler pulley. Perhaps they would be of some practical value since they were designed to carry a sanding belt. One nut was removed and the drive pulley was taken off the sander. Three long screws were removed from the side of the sander and the lower housing was released with the front idler pulley attached. I tossed the rest of the belt sander.

While tinkering with the idler pulley release lever, the idler pulley support arm, and the belt aligning screw, I realized that all the key parts that I needed to construct another twin spindle sanding attachment were in front of me. The two pulleys could serve as my new twin spindles. Better yet, the compact housing contained the important belt tension and release mechanism, the belt tracking adjustment, and even the flat span or platen which is located between the spindles.

I didn't have to make patterns, cast parts, or do any difficult machining. The complicated work was done for me by the manufacturer. I simply used these well engineered, high quality parts as the nucleus of a new twin spindle sanding attachment.

Trial And Error Construction

Although most belt sanders have similar characteristics, there are far too many brands, models, sizes, and mechanical variations to cover with any single drawing. I have included the list of materials that I used on my sanding attachment. That, in addition to my photographs, will serve as a rough guide as you construct your sander.

With a sanding belt on your sander, take an accurate measurement of the longest possible span from the outside

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***Dick Dorn** is a frequent contributor to* Popular Woodworking *and teaches high school woodshop in Oelwein, Iowa.*

of one pulley to the outside of the other one. Write the measurement down for future reference. Now unbolt or unscrew the rubber-covered drive pulley and the lower housing unit which includes the idler pulley and belt adjustments.

You won't need the cork–shoe covering or the steel–shoe covering screwed to the front end of the platen portion of the housing, so remove them. Note that the sanding belt on the twin spindle sanding attachment rotates in the opposite direction from your belt sander. It's important to file or sand any square or sharp edges from the opposite end of the platen so the belt won't be torn.

Check all the parts and their specific functions. Now is an ideal time to clean, oil, grease and check the idler pulley bearings—the bearings can be replaced if necessary.

Axle, Bearings And Drive Spindle

You'll probably find that the rubber-covered drive spindle is recessed at both ends and has a hole through the center. Locate a steel axle to fit the diameter of the hole in the spindle, as well as two sealed ball bearings to fit the diameter of the axle. Cut the axle long enough to extend upward to the chuck of your drill press with an allowance of several inches for work clearance. Polished steel rod is available in standard sizes. If the hole in your drive spindle is an odd size, the drive spindle needs to be reamed accurately. A machine shop can ream the hole in minutes and they probably have the axle material and ball bearings you need. If not, try an electric motor repair shop.

Viewed from the side, the axle extends downward below the drive spindle the thickness of one of the ball bearings. Determine its location and use a felt pen to mark both ends of the axle where it leaves the hole in the spindle. Roughen or score the span of axle that is inside the spindle with a grinder or file. Place a liberal amount of epoxy on the roughed up span and inside the hole of the spindle. Insert the axle to the proper location, wipe off any excess epoxy, and allow it to cure. If the hard rubber cover of the drive spindle is uneven or scored, chuck the axle in a drill press or lathe and true the rubber surface with a file or sandpaper.

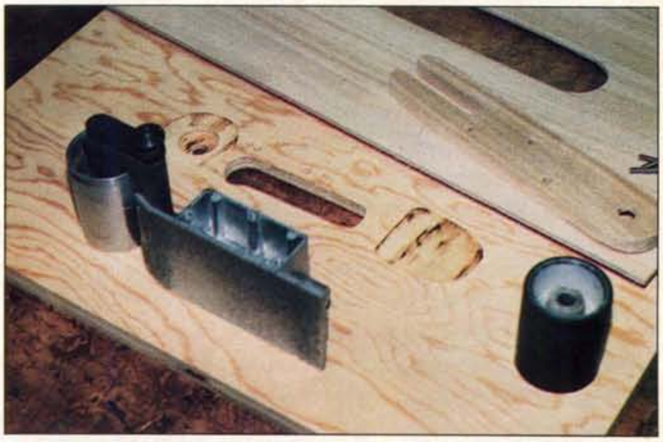
Twin Spindle Sanding Attachment					
Cutting List					
		Finished Size			
Qty	Part	T	W	L	Piece
1	A	¼"	14½"	22½"	oak baseboard
1	B	¾"	14½"	22½"	fir baseboard
1	C	¾"	2¼"	10½"	cap board
Supplies					
2	½" I.D. sealed bearings				
1	½" X 7" polished steel axle				
3	#10 X 2" sheet metal screws				
30	⅜" X ¾" diameter ring magnets				
1	12" X 12" anti–skid tape				

The two ball bearings that slide onto each end of the axle need to come to a positive stop on the axle. As viewed from the side, the full edge of both ball bearings is fully exposed at each end of the drive spindle. Make the stops from a stack of washers, from tubing cut to the right length, or use shaft collars with set screws.

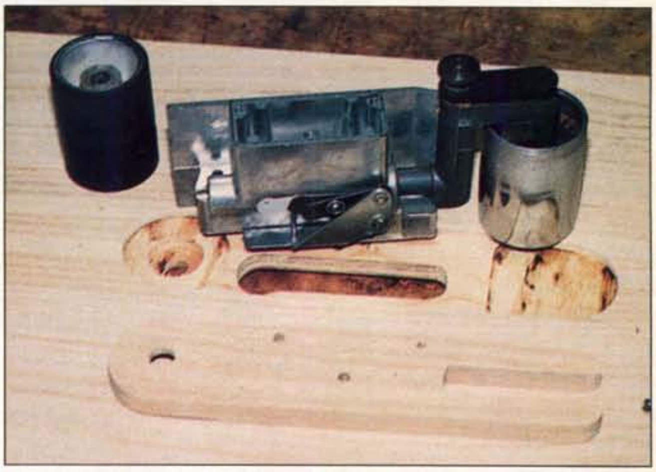
The Base And Cap Boards

Two individual boards, a base board and a cap board, tie the separate pieces together into a usable sanding attachment. The two spindles and the entire housing unit are placed on their side in a vertical position while the drill press

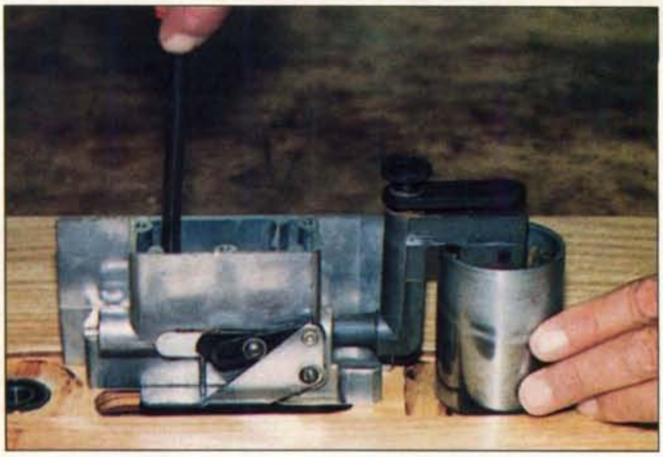
Make the base from two pieces of laminated plywood. The cutout must be large enough to allow clearance for the belt.



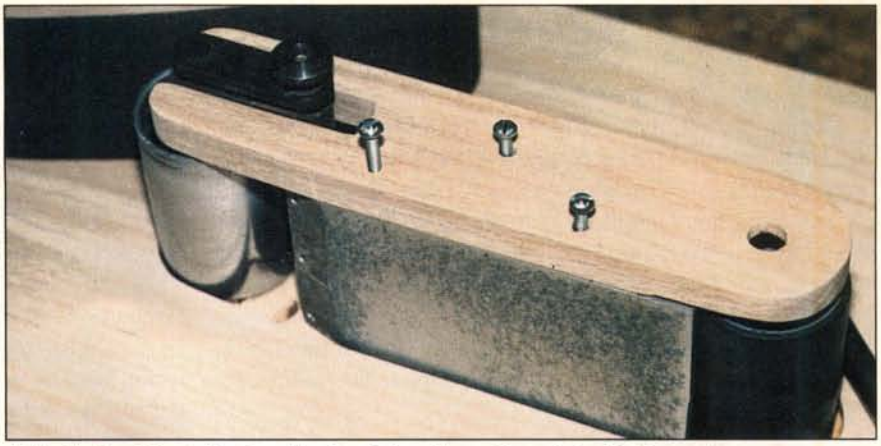
The attaching hardware will vary, depending on the sander you start with.



You may have to drill a couple of holes through the housing to fasten the mechanism to the baseboard.



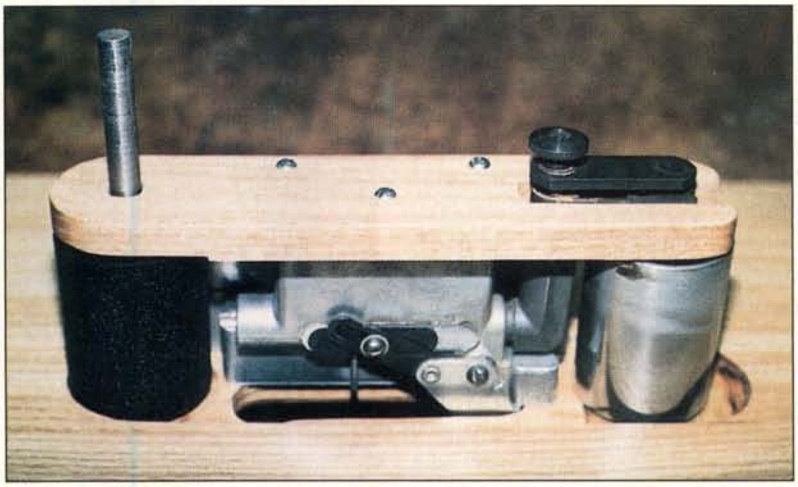
provides the power. The drive spindle ball bearings are aligned and embedded in the base and cap boards. The housing unit, which contains the belt adjustments, is sandwiched between both boards.



Note the tracking adjustment nob retained from the original belt sander.

Make the base from two pieces of laminated plywood for a sturdy work surface. Cut the ¼" oak base board (A) and the ¾" fir base board (B) to the dimensions you want. Refer to the Cutting and Supplies List and the photographs for ideas to determine the size of your work surface. To put the photographs in proper perspective, the table surface of my drill press is 14" wide and 11" deep—the sander uses a 3" X 24" belt. I used oak plywood for the work surface and ¾" fir plywood for the bottom laminate. Don't laminate the pieces of plywood at this time.

Locate centers on the ¼" piece and draw two bisecting lines, parallel with the edges and ends, to align and center the sanding unit. The top layer has an elongated hole so the sanding belt travels slightly below the work surface. You previously measured and recorded the full-length span of your belt sander with a sanding belt; transfer, center, and indicate the span on your plywood with two pencil marks. Now, add ⅛" at each end of the span to compensate for sanding belt variations and expansion during use. Established the location, length, and shape of the hole.



The tensioning lever is accesed through a hole in the bottom of the base.

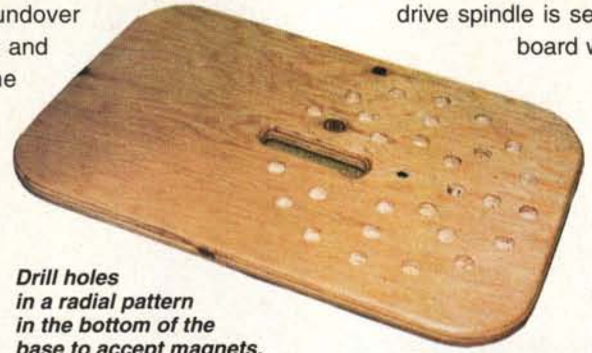
With the plywood in front of you, lay out the drive spindle to your right, the idler spindle to your left, and the platen facing you. Measure the drive spindle and use a compass to transfer the future location of the spindle to the plywood. Allow the circle to touch the span limitation mark. Repeat this operation for the idler spindle at the opposite end of the span limitation. Now place the housing unit, with the idler spindle attached, over the layout. The idler spindle should be in perfect vertical alignment with the idler spindle circle, and the platen surface should be in alignment with the drive spindle circle. To complete the hole pattern, use a straightedge and a pencil to connect all the spans around the established spindle circles and platen. This pattern represents a sanding belt in position. To enable the sanding belt to travel freely without rubbing, scribe a ⅛" margin around the entire pattern of the hole. Don't erase the original pattern line—you'll need it later. Cut the hole accurately just inside the scribed line and sand the rough edges. Although you'll drill a hole to insert a blade for cutting, try to keep the cutout intact—you'll need it later, too. Use your disc sander to sand the edge of the cutout to the pattern line. Drill a ⅛" pilot hole in the center of the drive spindle.

Place the ¼" plywood piece on top of the ¾" piece, align the edges and ends, and draw around the inside of the elongated hole. Place the cutout back into its original position and visually align the ⅛" gap so it's parallel with the hole. Using the small hole in the cutout as a guide, drill the ⅛" pilot hole through the lower plywood to transfer the center of the drive spindle. Remove the top plywood and the cutout.

On the ¾" plywood, rout the areas directly below the two spindles, within the pattern, to a flat depth of ⅛" to allow clearance for the rotating spindles. Proper sanding belt tracking is managed by tilting the angle of the idler spindle, and that also requires some clearance.

Drill the hole for the drive spindle bearing to a depth equal to the thickness of the bearing. Use a drill bit that forms a flat bottom, is the same size as the bearing, and has a point to align with the ⅛" pilot hole. I used a spade bit and luckily the bearing fits perfectly. If your bearing fits loosely, shim it with tape wrapped around its edge. Now drill through the center of the bearing cavity with a ½" bit to allow for clearance if the axle protrudes from the bottom of the bearing. Place the two pieces of plywood together and check your work with the housing unit and spindles in position.

On some belt sanders the tension release mechanism is controlled by a lever. On others, you push the idler spindle toward the rear of the housing until it locks in place, and release it by a downward push on the idler spindle. If you have a lever controlled mechanism, you may require an access opening in the base board to allow for lever movement. Work the lever a few times, make some reference lines, and cut the access opening.



Drill holes in a radial pattern in the bottom of the base to accept magnets.

Laminate the two pieces of plywood with glue; keep the edges flush and use enough clamps so the entire surface is properly laminated. I rounded the four corners and used a ½" radius roundover bit to rout the edges of the top and bottom surfaces. Use the same bit to round the edges of the access hole on the bottom side of the base.

Place the housing in position on the base board and determine how to fasten it securely. Again, all sanders are different. On mine, I drilled through two individual layers of housing located inside a housing cavity and attached them with three long sheet metal screws into the base board. Examine your housing and determine a good drilling location that doesn't interfere with the release lever mechanism. Temporarily fasten the housing unit to the base board.

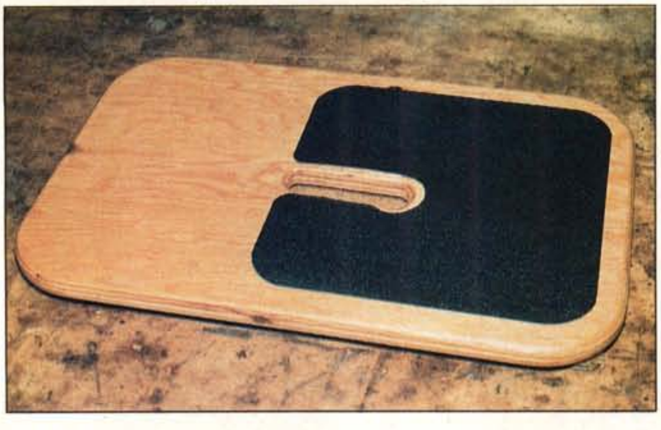
Cut And Shape The Cap Board

The cap board (C) is not difficult to make, but it must be accurately shaped and aligned. Shape it like the cutout from the elongated hole in the base board—use the cutout for your basic pattern and make adjustments according to your specific needs. Use a piece of hardwood to match the surface of the base.

Use the pilot hole in the cutout to determine the exact center location for the axle and the bearing. Duplicate the same drilling sequence you used to prepare the base board for the axle and bearing seat. Rout ⅛" off the underside of the cap board directly above the spindles to allow for clearance of the rotating spindles.

The cap board serves as a guide for the idler spindle support arm and tracking screw. Cut a slot at the nose end of the cap board to allow the support arm to slide back and forth when the release lever is operated. Be sure the support arm is properly aligned before you make the pattern for the slot. The slot must allow for free movement of the support arm. It must, however, fit accurately or the idler spindle will have lateral movement and tracking will be difficult.

Cover the flush magnets with non skid tape.



Attach the cap board to the housing with the same screws that held the housing in position when it was connected to the original belt sander. Locate the exact position of holes and drill them in the cap board. Check and ensure that the drive spindle is set at a perfect right angle to the base board when you determine the placement of the cap board. Drill the holes, insert the screws and check the operation of the entire twin spindle sanding attachment. Dismantle the project when you are satisfied with the performance.

A Magnetic Base

You can fasten the twin spindle sanding attachment to your drill press table with clamps along the rear edge. Or you can make the underside of the base magnetic and forget the constant hassle of clamping. I've used magnetic bases on many jigs and devices and have never regretted the added expense or work.

Embed individual round magnets, called ring magnets, in the base board with a little dab of epoxy. Use a ¾" Forstner bit and drill the holes a little more than ⅜" deep. Place 25 to 30 ring magnets, in a pattern approximately as large as your drill press table—this should be enough to hold the sander securely in place. Use the drive spindle hole as the center point for your pattern layout. The magnets must be flush with the base board. If any part of any magnet or epoxy glue protrudes above the surface of the base board, file or sand it flush. Cover the area with anti-skid tape after the final coat of finish is applied (photo below). The anti-skid tape seals and protects the magnets and prevents the sander from easily turning.

The Finish And Final Assembly

Sand the wooden boards and apply three coats of finish. I used Deft. It's a good finish and it dries fast. A smooth working surface makes manipulation of your work much easier.

Assemble your twin spindle sanding attachment and fit it with a sanding belt. Lower your drill press table so the axle is about ½" below the geared chuck. Lower the chuck around the axle and tighten the quill before you tighten the chuck. You will immediately notice that the tracking mechanism works easier than it did on your belt sander.

Most of your sanding is concentrated on the lower half of the belt. When it's worn, which will be quite some time, flip the sanding belt over to the other side. You can purchase sanding belts that travel in either direction.

Have Patience

I certainly don't advocate the premature dismantling of a usable belt sander. But like all other tools, they eventually fail and need to be replaced. There is consolation in knowing that you can put your belt sander back to work for small change. If yours is in fine shape, have patience. Go to a few garage sales, or a used appliance store, check with tool repair shops and ask your friends. You'll find a belt sander that has the parts you need. PW

A Popular Woodworking Project

Whaler's Sea Chest

by Robert L. Elmore

During the Glorious Era of Sail, men carried their personal belongings to sea in handmade wooden chests. The chests were made from a variety of woods, but white pine was the most common. The top, bottom, and sides were always made from a single plank; while their corners were constructed with box or dovetail joints. Intricate rope–work beckets and nautical carvings served to emphasize the simple lines and natural beauty of the wood.

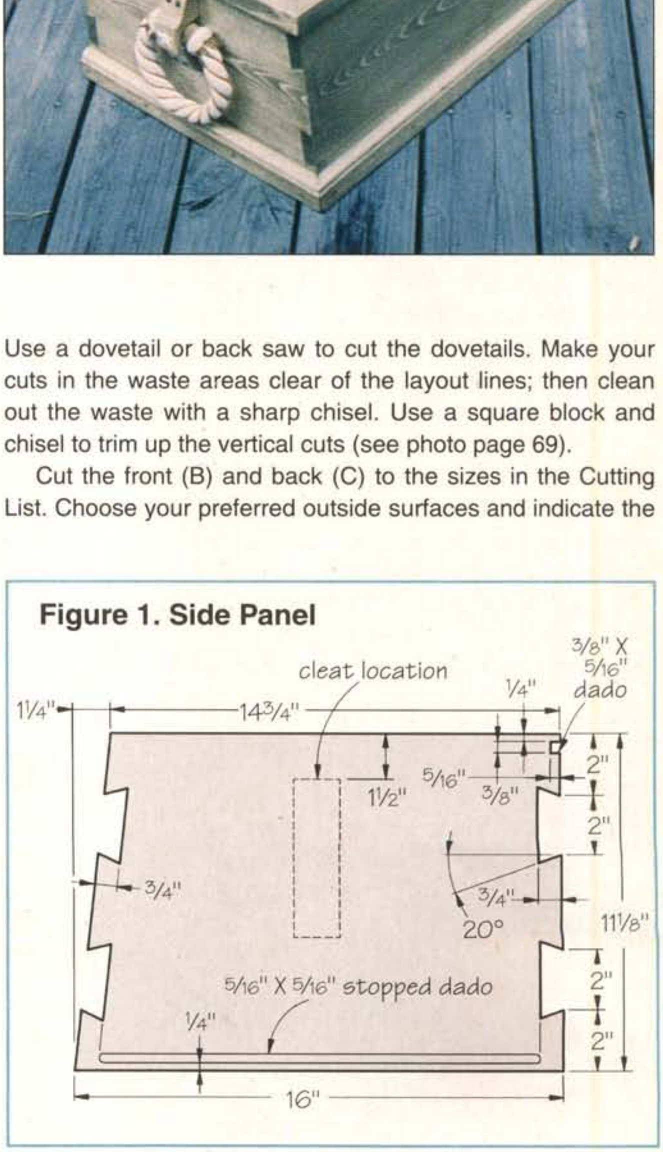
The construction of the whaler's chest faded with the clipper and whaling ships. Most surviving chests are now found in nautical museums. Occasionally, an authentic chest turns up on the antiques market and brings a price that would make a banker blush.

Making the Case

Start by cutting the sides (A) to the dimensions given in the Cutting List. Use masking tape to identify the right and left pieces and the top edge. Measure 1¼" in from the front *top corners* and mark the taper cutback on the sides (see Figure 1). Use a tapering jig to cut the sides identically. Layout the dovetails according to Figure 1 and mark the waste to avoid cutting errors. Use a square and a bevel gauge to insure accuracy. All the dovetails are cut at 20°. Use a dovetail or back saw to cut the dovetails. Make your cuts in the waste areas clear of the layout lines; then clean out the waste with a sharp chisel. Use a square block and chisel to trim up the vertical cuts (see photo page 69).

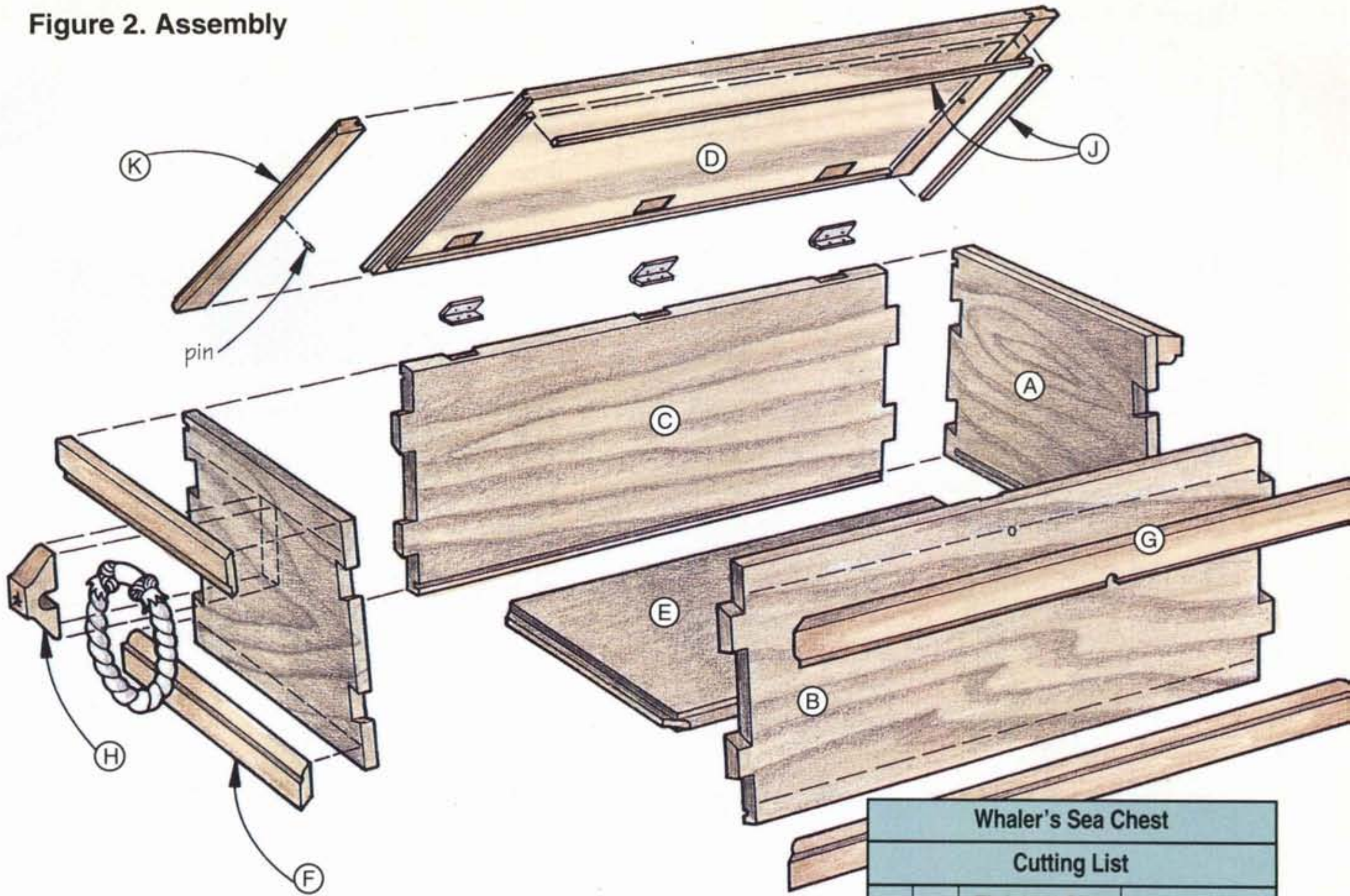
Cut the front (B) and back (C) to the sizes in the Cutting List. Choose your preferred outside surfaces and indicate the

Figure 1. Side Panel



***Robert L. Elmore** is a dedicated woodworker and freelance writer from Richmond Hill, Georgia.*

Figure 2. Assembly



Whaler's Sea Chest					
Cutting List					
		Finished Size			
Qty	Part	T	W	L	Piece
2	A	¾"	11⅛"	16"	sides
1	B	¾"	11¼"	8"	front
1	C	¾"	11⅛"	28⅛"	back
1	D	¾"	17"	28⅝"	top
1	E	¾"	14¾"	27⅛"	bottom
4	F	¾"	1½"	24"	side moulding
2	G	¾"	1½"	36"	front moulding
2	H	1½"	1½"	5¼"	cleats
4	I	¼"	¼"	36"	rain stops
2	J	¾"	1½"	24"	top end boards
2	K	¼"	diam	1½"	pins

top edges. Lay the back flat with the outside surface facing down on a table, bottom edge toward you. The dovetails in the sides are the templates for the pins in the front and back. Align the top edges using the left side as a template and mark the layout and cut the pins.

The pin layout procedure is the same for the front panel, except you will be working with the tapered edges on the front side pieces. Be certain to align the inside front edges when you mark the pins on the front. The excess stock on top edge of the front panel will be removed during final assembly. When you finish making the pins on both the front and back, you're ready for a trial assembly. Dovetail joints should slip together with moderate hand pressure. Adjust the fit by shaving slight amounts off the pins in the neccesary areas. When all fits are good, disassemble the pieces.

Set your router table with a 5⁄16" straight bit and cut the dados according to Figure 1. The dado cuts for the front and back are straight through; the cuts on the sides are stopped 5⁄16" from the edges. Use stop blocks clamped to the fence and drop–plunge the workpiece onto the cutter.

Edge glue enough stock to make the top (D) and bottom (E). When the glue is dry, cut the pieces to the dimensions given in the Cutting List.

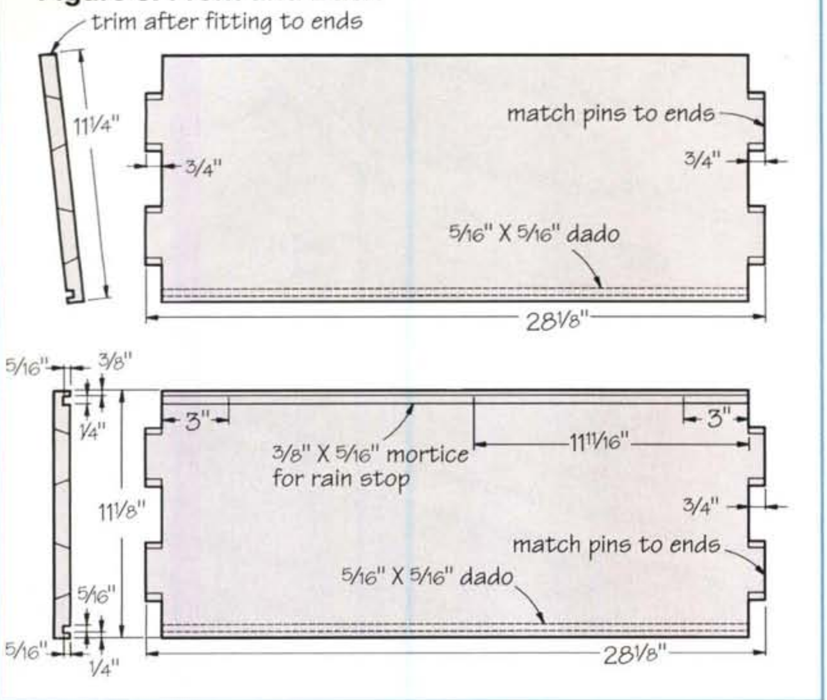
Rout the ends of the top with a ¼" dovetail cutter. Cut a ¼" X ¼" rabbet around the four bottom edges; then, flip the piece over and rabbet the other side. Miter the corners to 45° without cutting beyond the rabbets as shown in Figure 4.

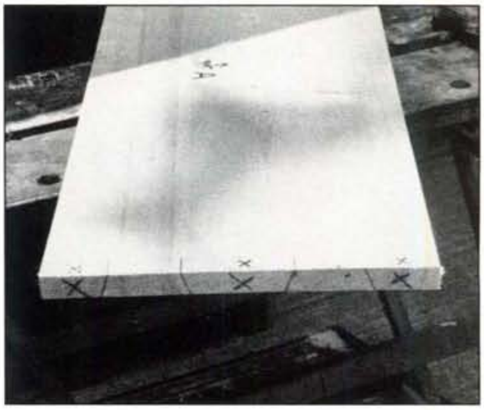
Set your table saw fence 1½" from the blade and rip the moulding pieces (F,G and J); then cut them according to the Cutting List. Use a dovetail bit on center to make a ¼" deep groove on the two topend boards (J). These pieces slip fit on the ends of the top. Use a ⅜" round over bit to machine the opposite edge of the two top end moulding pieces. Now, round the rest of the molding strips (see Figure 5).

One end of each molding strip has a compound cut. Miter the moulding on your radial arm saw with a 7½° left traverse and 46° left tilt. Cut all four side molding pieces with this setup. The two front moldings are straight 45° cuts.

On the outside of the back piece rout a 5⁄16" X 5⁄16" dado ¼" top edge. This groove accepts a rain stop (I) when the top is open. Groove the back and the top of the sides so that

Figure 3. Front and Back





Layout locations for dovetails and pins on both sides of chest casing pieces. Mark all waste areas.

Figure 4. Lid and Bottom

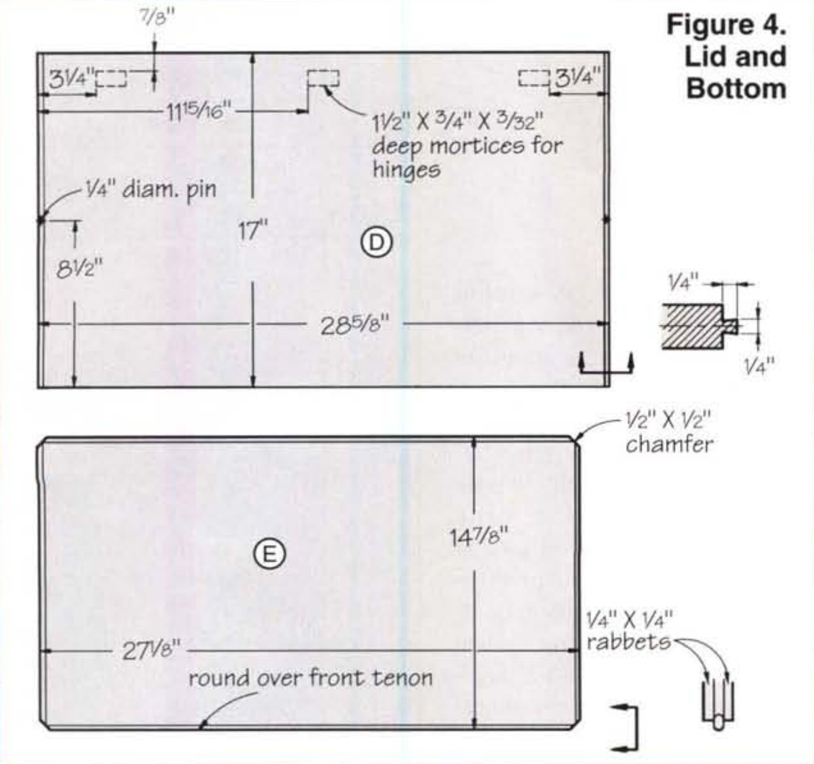


Figure 5. Endcaps and Moulding

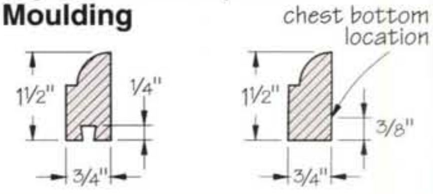
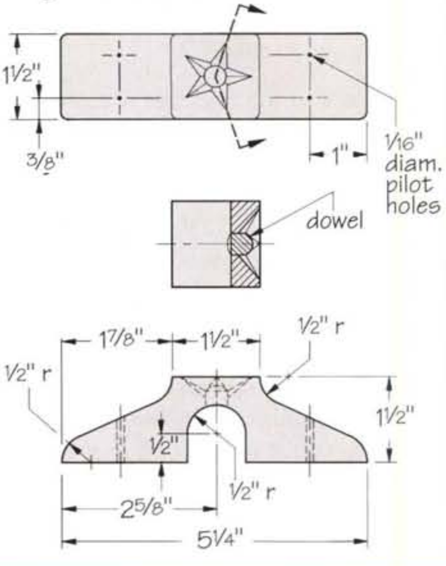


Figure 6. Cleats



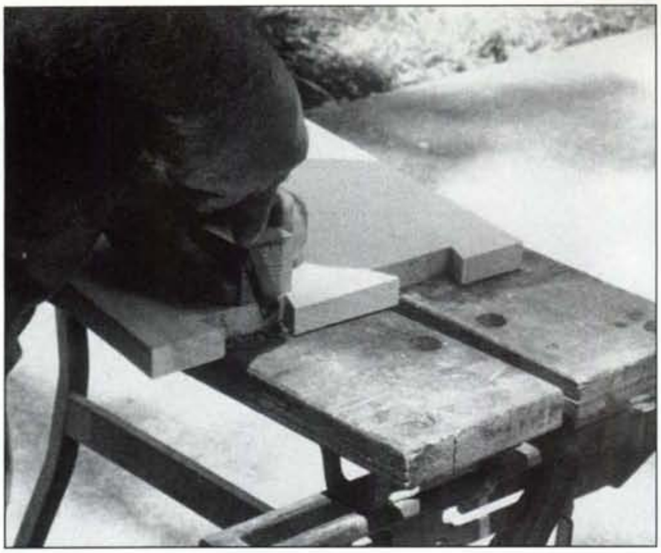
they have a continuous dado through them (see Figure 5).

After cutting all the moldings, sand all the pieces of the chest through 220 grit paper.

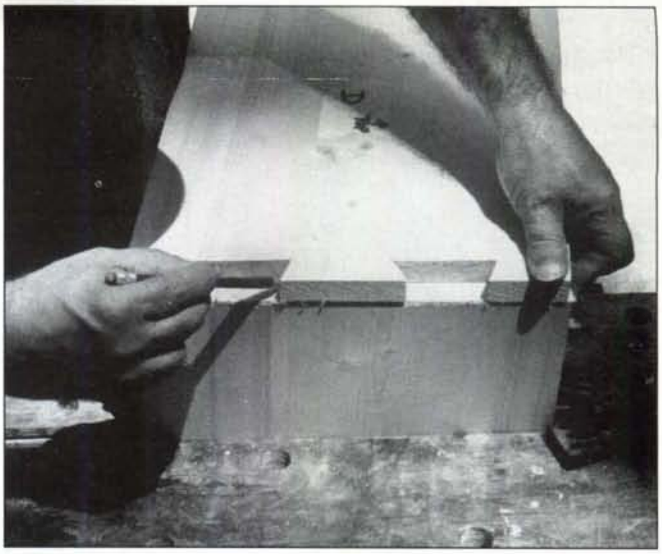
Making the Cleats

Practice chip–carving the star on some scrap stock before you make the cleats (H) (see Figure 6). Ignore the ball in the center of the star for now. Use the full–sized pattern in the PullOut™ Plans and bandsaw the cleats, sand the fronts flat and carve the stars in the faces. Drill the center of star with a ¼" forstner bit. Round the end of ¼" dowel, insert it from the back and trim the excess to get the half ball inside the star. Drill the 1/16" pilot holes as shown in the Figure 6. Round the cleats edges slightly, but leave the backs flat and sharp at the mounting surface.

First, glue the left side to the back. Brush a thin layer of



Use a square block when cutting dovetails to keep the cuts vertical to the edge of the piece.



Mark the pin locations on the front and back using the already cut sides as templates. This should ensure acurate joints.

glue on all the dovetailed surfaces. Next, stand the two pieces upright and glue the front to the side. Slide in the bottom, but don't glue it–leave it free to expand and contract if necessary. Glue the right side to the back and front, fitting the bottom in the dado as shown in the photo to the right. Pipe clamp the assembly along the length of the chest. When dry, plane off the projecting front portion to match the other top edges of the chest.

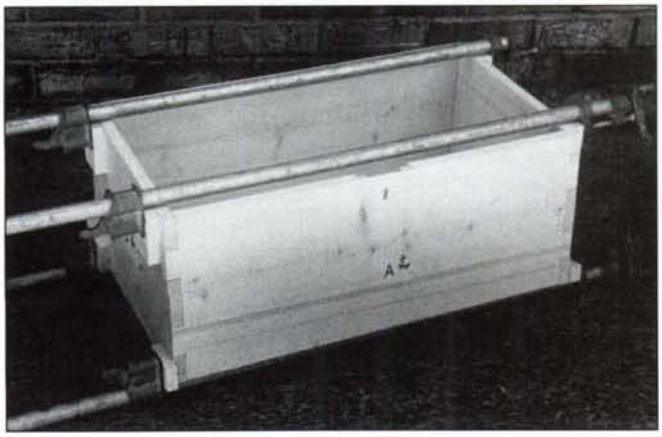
Slide the dovetailed end caps onto the top. Drill the 1/4" retaining pin hole as indicated in the Figure 4.

Attach the moldings with decorative square cut nails and a little glue. There are no back moldings. Carefully sand the joints of the moldings.

Install the Hinges and Rain Stops

Position the hinges as shown in Figure 4. Mortise cut the hinge placement on the back's top edge so one half of the hinge pin over hangs the back edge as shown in Figure 7. Make matching mortises for the top leaf. The top overhangs the back by 1". Raise the top fully and mark the location of the rain–stop groove on the underside of the top. Install the

Pull the assembly into square with pipe clamps. Note the padding blocks to prevent the clamps from marring the surface.



Insert the bottom without glue so that it is free to expand and contract over time.

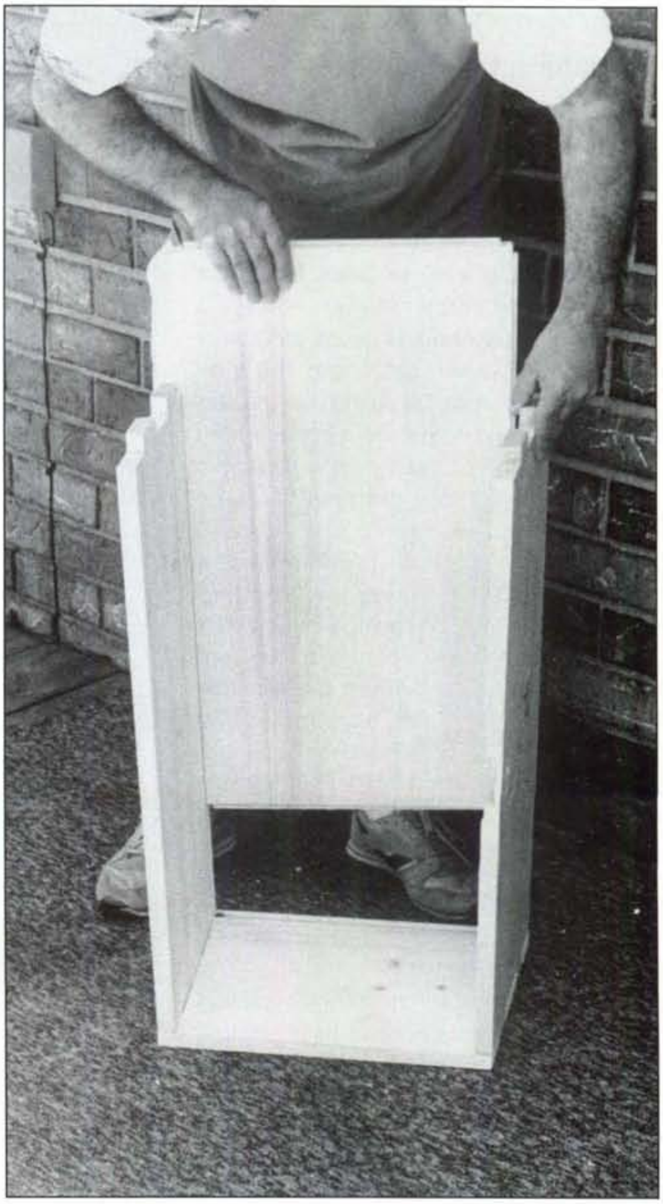
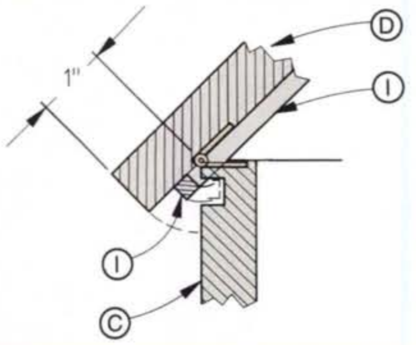


Figure 7. Hinge and Rain Guard Detail



rain strips (I). When opened, the rain strip drops into the groove without touching the back of the chest. Fasten it in place with ½" wire brads and glue. The other three rain strips are positioned ⅛" away from the sides and front.

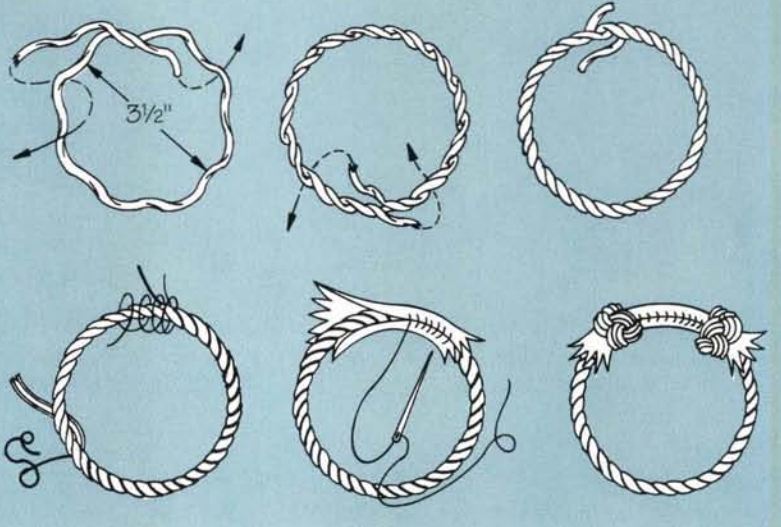
Finishing the Sea Chest

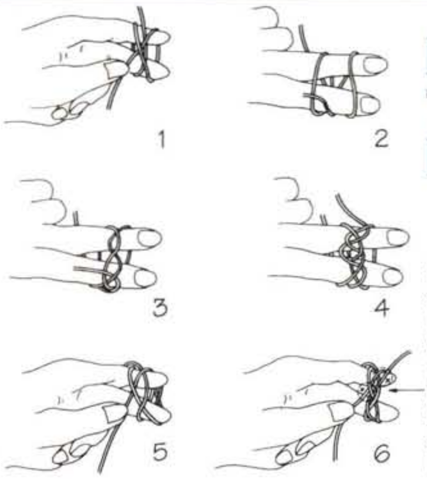
An authentic whaler's chest is painted in pale shades. I chose to give mine a stain followed by five coats of high gloss polyurethane. Use light hand sanding with fine #0000 steel wool between each coat to create a mirror finish. Finish the cleats in the same manner. Place the rope grommet handles inside the cleats and mount them just under the side moldings. Position the cleats with the star point up. Wood screw them in place from the inside, or cut square nails and drive the head ends into the pilot holes as shown in Figure 5.

I purchased a very authentic-looking period lock for the front from Albert Constantine & Son, Inc., 2050 Eastchester Road, Bronx, New York 10461 (800) 223 - 8087. Order part #75S7. Ask for their free catalog. Some hardware supply centers carry a selection of square cut nails. If you have difficulty locating a source, contact the Tremont Nail Company, Box 111, Wareham Ma., 02571.

Some of the old chests were painted white inside—no doubt to help locating things in poor light. I gave mine the same finish inside and out. Close the lid, stand back and admire your handiwork. You are now prepared to sign aboard the first tall ship leaving port. PW

Making Rope Grommet Handles





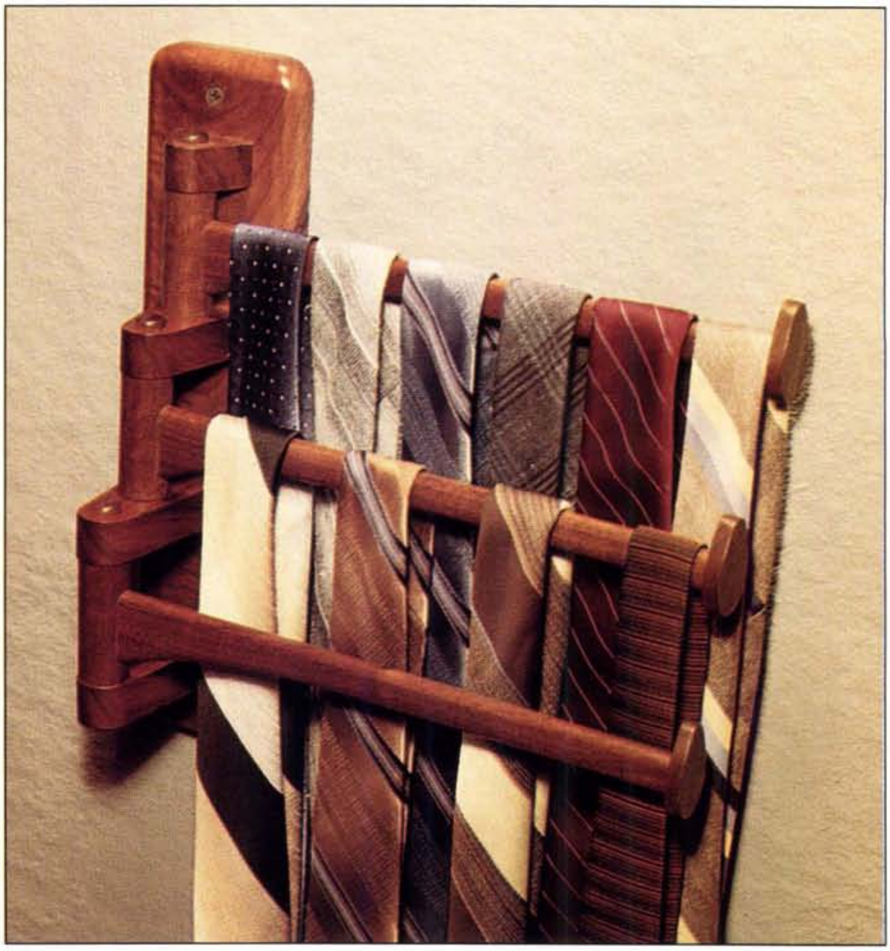
Running Turk's Head

Note the double stranding over and under at this point. Continue to follow the pattern weaving the line over and under until a 3 strand configuration is achieved over the whole knot.

Unravel three strands from a 48" piece of ½" hemp rope. Tape the ends of the strand to prevent further unraveling. Reweave this strand into a 3½" circle according to the figure. Tie fishing line tightly around the ends and trim the excess rope.

Wrap the rope circle with a 1" strip of cotton cloth or old sheeting. Turn under ¼" of the strip on each edge so the finished wrapping follows the turning spiral of each strand. The bottoms of the grooves between strands will be filled later. Stretch the cotton strip on the center of each strand until all three are covered. Tie the end of the wrapping with fish line and paint the grommets white. Cut a piece of ⅛" mason's line and spray paint it red. When the rope grommets are dry, wrap the red painted mason's line into the grooves of the grommets. Tie off the ends and trim the excess. Cut two leather patches to the size shown in the PullOut™ Plans. Prepunch a series of holes then stitch the leather around the grommet. Work a running turk's head knot around the leather patch on both sides and draw it up tight. PW

TIE RACK



by Joe Ransil

Here's a convenient tie rack that can display two dozen ties. Its good looks will complement the decor of any bedroom closet and it uses a minimum amount of wall space. Choose the wood and a finish to match your existing furnishings. I made mine of black walnut and used an oil finish.

The only trick to the project is making the spindles (A). They are drilled clear through with a 1/4" hole that is aligned and concentric with each dowel (see Figure 1). Otherwise, the arms will swing out of line with each other, and spoil the appearance of the rack.

To drill these right, start with a 1" X 1 1/8" X 8 1/4" piece of stock. This is long enough for the three pieces required (see Cutting List), plus a little extra to permit squaring of the ends when cutting them to length. Carefully split the stock into two 1" X 1/2" X 8 1/4" pieces; use a table saw with a smooth cutting blade. Now rout a 3/32" deep groove down the center of the two cut surfaces with a 3/16" core box bit. The grooves should run the entire length of each piece. Glue and clamp the split surfaces back together, matching the grooves and the grain.

After the glue dries, chisel away any squeeze–out, clamp the piece in a vise, and run a long 1/4" drill through the entire length of the 3/16" channel described above. Use a bit with a standard machine–ground tip, rather than a brad–point bit, to be sure the drill follows the pilot hole. If you don't have a long enough bit, drill from each end; then drill the hole in the center section after the blank has been cut into spindles. Square both ends of the blank leaving a minimum of 8".

Study Figure 2 and locate the three mortises in the support dowel. Cut them 3/8" X 1 1/4" and 5/16" deep on a surface that doesn't have a glue joint on it. Cut the mortises with a table–mounted router using a fence and stop blocks.

Next, mount the blank in your lathe. It is a good idea to fit plugs in the three mortises to keep the edges from chipping during turning. Make these plugs 3/8" X 5/16" X 7/8" with squared ends; they don't need to fill the rounded ends of the mortises. Lightly glue them in place. Turn the blank to a diameter of 7/8" and sand it smooth. Refer to Figure 2 to locate the cuts and mark the blank, with a sharp–pointed chisel. Remove the blank from the lathe, and sand parallel to the grain with 220–grit or finer sandpaper. Chisel out the three protection plugs; then bandsaw the blank into the three lengths using the cut marks. Use a disc sander with a V–block clamped to the table to square the ends. Check the accuracy of the setup by sanding a 3/4" or 1" dowel, and check the finished

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Joe Ransil is a retired aerospace engineer and a woodworker.

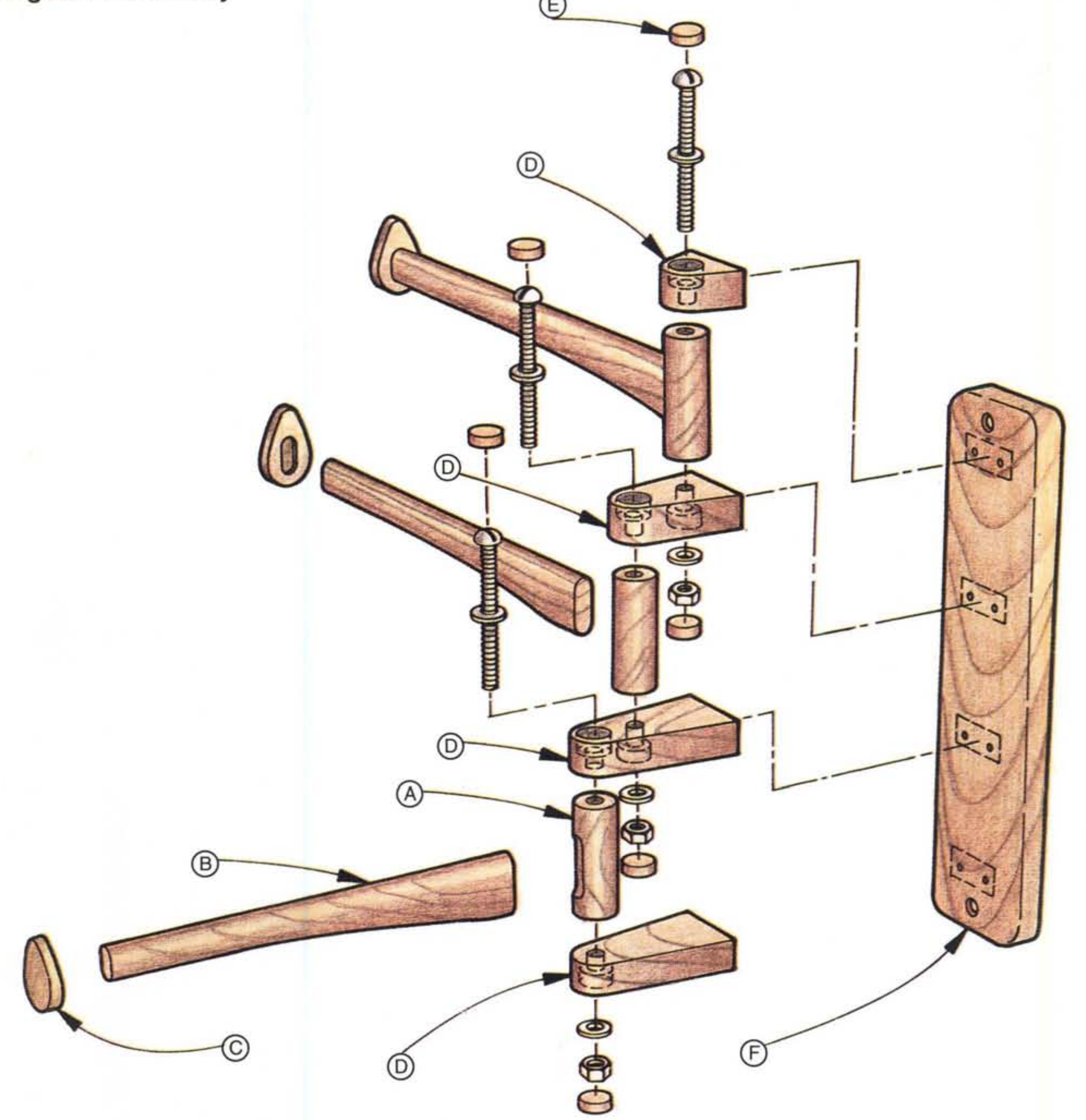


Figure 1. Assembly

Tie Rack					
Cutting List					
		Rough Size			
Qty	Part	T	W	L	Piece
3	A	⅞"	diam	2½"	spindles
3	B	⅜"	1¼"	11"	arms
3	C	¼"	1"	½"	arm ends
1	D	¾"	1½"	12"	spindle brackets
6	E	½"	diam	¾"	plugs
1	F	¾"	3"	12½"	mounting plate

end with a tri-square. It's important that the end truing operation is accurate or the arms won't rotate smoothly.

Transfer the full–size arm (B) pattern from the PullOut™ Plans to ⅜" stock. Band or jigsaw around the outline to form the three arms, then round the entire top and bottom edges with a 3⁄16" round–over bit. Finish–sand the arms, and glue them into the mating mortises in the dowels.

To make the arm ends (C), first cut three ⅛" deep ⅜" X ⅝" mortises spaced 2" apart in a piece of ¼" X 1½" X 8" stock. Cut out the arm ends using the pattern provided in the PullOut™ Plans. Register the mortise cutout in the pattern with the mortises in the stock, and pencil in the outline for all three pieces. Cut them out with a scroll saw. Round the edges and sand them smooth. Glue an end to each of the arms.

Transfer the patterns from the PullOut Plans™ for the four spindle brackets (D). The two lower brackets use the same pattern, but the bottom support has only one bolt hole, while

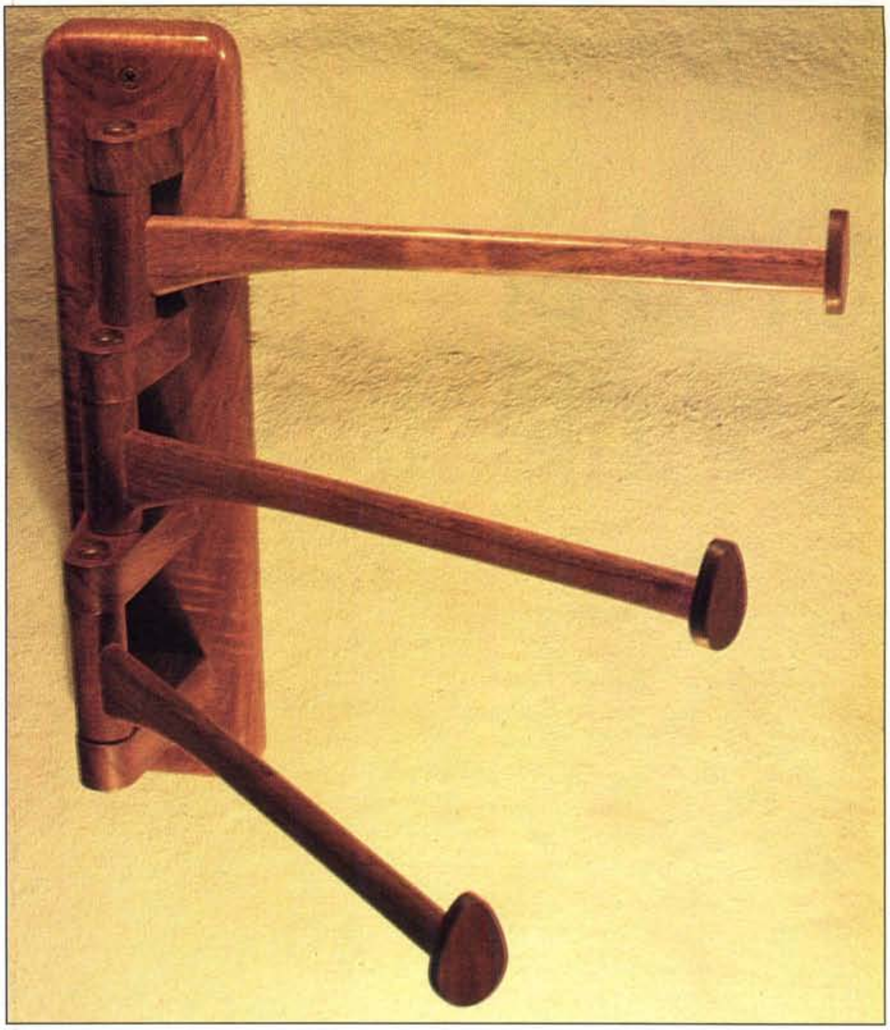
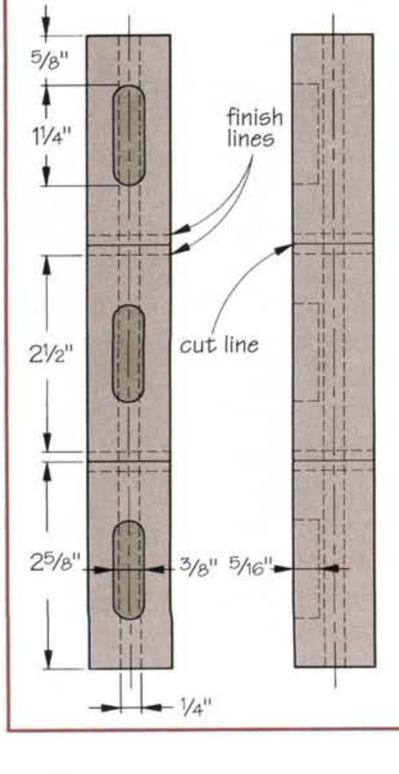


Figure 2. Dowel Blank



the other has two. Counterbore the bolt holes ½" deep using brad–point bit. Study Figure 1 to determine which surface gets counterbored for each hole. Drill the counterbores first; then drill through with a ¼" brad–point bit centered in the counterbore hole. After all the bolt holes have been drilled, finish-sand the brackets.

Apply the finish to the brackets and the arm and spindle assemblies. When it's dry, attach the spindle assemblies to the brackets with three ¼" X 3" stove bolts and matching hex head nuts. It is a good idea to put washers under the nuts and bolt heads. You'll probably have to drill out ½" washers with a ¼" bit to get the right size. Put a small dab of epoxy on the ends of the bolts when applying the nuts to prevent them from loosening up when the arms are rotated. Carefully torque the nuts to provide some friction between the spindles and the brackets, so the arms don't swing too freely. Cover the bolt holes with ½" plugs (E), and finish them to match.

Cut the mounting plate (F) to the size given in the Cutting List. Round the corners to a ½" radius and round over the front edges with a ⅜" roundover router bit. Draw a line down the center, and drill a pair of ⅛" mounting holes on the center line ¾" from the top and bottom ends. Countersink these holes for #8 flat–head wood screws. Finish–sand the mounting plate, and apply the finish.

When the finish is completely dry, center the support assembly on the mounting plate. Apply clamps to the first and third support brackets, and clamp them firmly in place. From the back, drill and countersink two holes into each of the two spindle brackets that are not covered by clamps. Use #8 x 1¾" screws for the bottom two brackets, and 1½" screws for the top two brackets. Remove the clamps, drill and countersink the other four holes, and install the last four screws. The rack is now ready to be mounted on the wall and draped with ties. PW

A Popular Woodworking Project

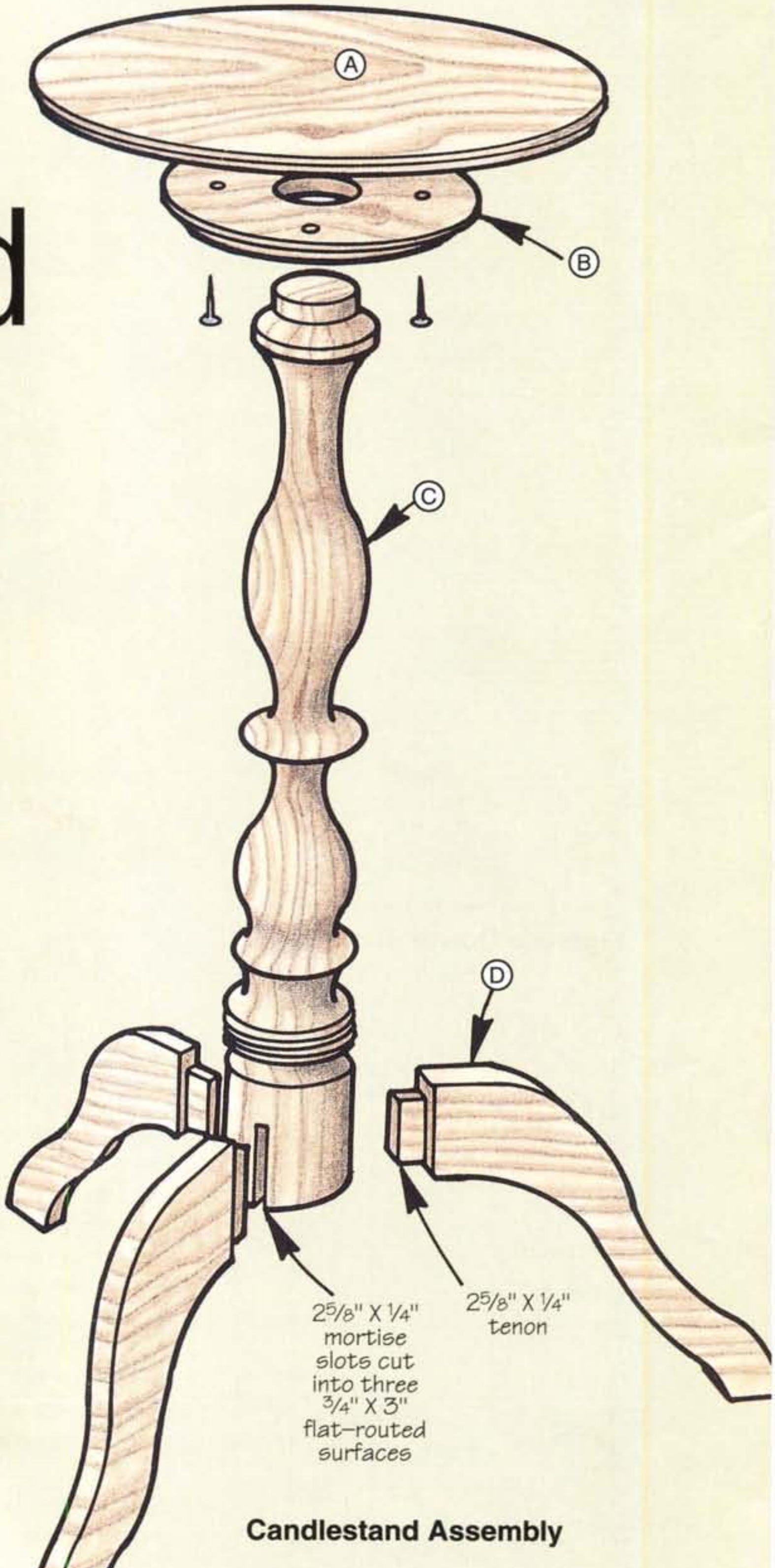
Shaker Candlestand

by Dana Martin Batory

This Shaker style oak stand is a copy of a vividly marked tiger–maple candlestand that was built in the Shaker community of Union Village, Ohio, and is now a part of the Warren County Museum collection in Lebanon, Ohio.

To begin, cut two blanks or glue–ups—one 13" X 13" for the top (A), and one 9" X 9" for the top support (B). Mark their centers by drawing diagonal lines (see the first photo below) and lay out the corresponding circles. Center the smaller square on top of the larger and drill a 1/16" pilot hole through the top support, and 1/2" into the top. Leave the

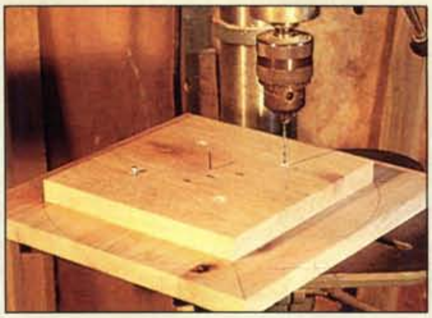
***Dana Martin Batory** works wood and writes about it in Crestline, Ohio.*

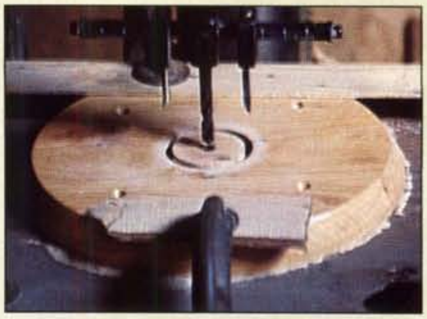

Ⓐ
Ⓑ
Ⓒ
Ⓓ
2 5/8" X 1/4" mortise slots cut into three 3/4" X 3" flat–routed surfaces
2 5/8" X 1/4" tenon

Candlestand Assembly

Draw diagonals on the top (A) and top support (B) blanks to locate the centers and lay out the cutting lines.

Shaker Candlestand					
Cutting List					
		Finished Size			
Qty	Part	T	W	L	Piece
1	A	¾"	12¾" diam		top
1	B	¾"	8¾" diam		top support
1	C	3"	3"	23"	post blank
1	D	¾"	5½"	13"	leg blanks


Leave the bit in the center hole to serve as a pivot while you drill the screw holes.


Clamp the top support to your drill press and use a circle cutter to drill a 2" mortise.

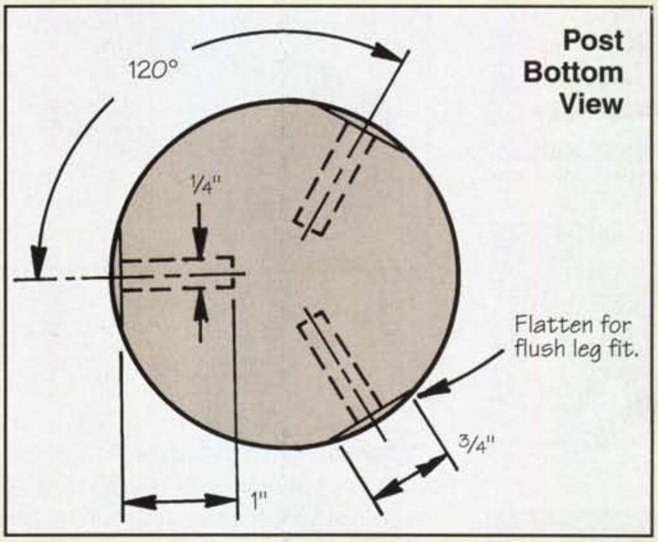
drill bit in place to act as a pivot and mark, drill, and countersink the holes for the four #8 X 1¼" FH wood screws. Separate the parts.

Use the circle cutting jig on your tablesaw (below) to cut the top and the top support to the dimensions given in the Cutting List. Next, set the blade on your table saw to 30° and bevel the edge on each piece. Adjust the circle cutter slightly and make the final 90° cut (0° setting on the tablesaw) to leave a ⅛" wide edge. Use a Forstner bit or a circle cutter to drill a 2" hole in the top support with the pilot hole as a drill guide (see photo above).

Turn the post (C) to match the template in the PullOut™ Plans. Custom fit the tenon to the top support mortise.

To make the leg mortises, I used an old metalworking lathe mounted parallel to my wood lathe with a small, high–speed electric motor and arbor mounted in the tool holder (see "Moto–Tool Mount" on the following page).

Lay out the mortise locations at 120° intervals around the base of the post as shown in the Figure to the right. Machine three ¾" wide flat surfaces the entire 3" length of the post base with a 1" straight router bit. Next, rout the three mortises ¼" X 1" deep to within ⅜" of the posts first groove.

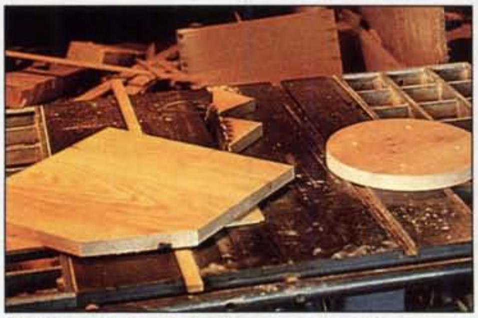


Cut the three 11" X 5½" blanks for the legs (D), and layout the shape of the legs and the locations for the tenons from the PullOut™ Plans. It's easier to cut the tenons while the blanks are still rectangular. Custom fit the tenons to the mortises. When they fit snugly, cut the legs out on your bandsaw or scrollsaw.

I prefer to sand and varnish all the parts at least three times (sanding between coats) before the final assembly. Do not varnish the surfaces where you will apply glue. Glue the post tenon into the top support. Do not glue the top to the top support—it should be free to "float" with changes in room humidity. Fasten the top to the top support with four #8 X 1¼" FH woodscrews. Glue the legs into place. Remove any excess dried glue with a wood chisel and apply a final coat of finish. Wax and buff when the candlestand is dry. PW

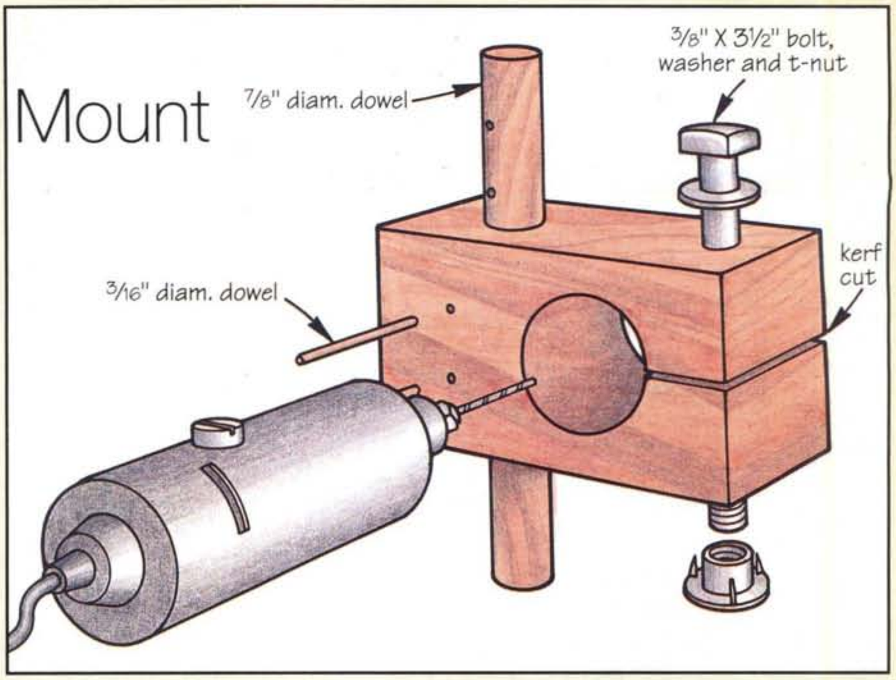
Table Saw Circle–Cutting Jig

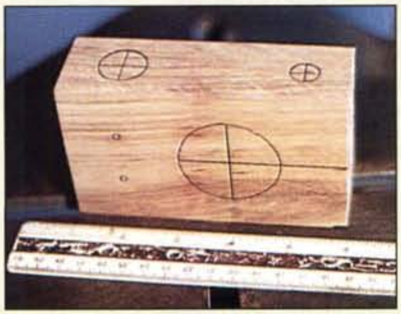
Cut a 12" hardwood strip to fit your tablesaw miter groove. Attach a piece of ⅜" plywood to the miter groove strip with ½" FH screws. Slide the jig through the blade to remove excess stock. Mark your circle radius perpendicular to the blade. Locate the center of the stock, drill a pilot hole and nail it to the jig. Make several passes to remove the large pieces. Nibble away the smaller pieces; then you can rotate the disk to cut the circle. For safety and accuracy, clamp the carrier board to the table when rotating the stock.


Cut the circle gradually—move the jig closer to the blade in a few steps.

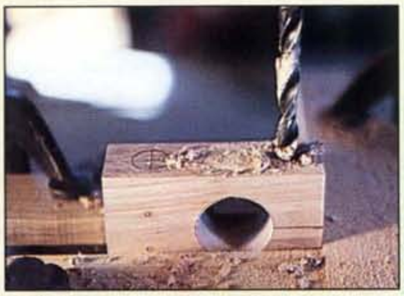
After you have cut the circle set your tablesaw to cut the 30° beveled edges. Use the same jig position.

Wood Lathe Motorized Tool Mount

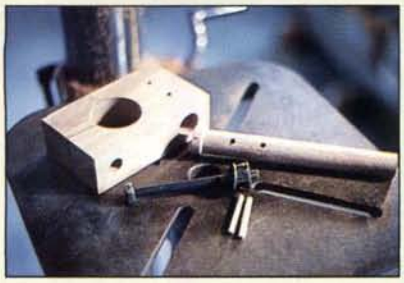



Lay out the holes to fit your motor and post diameters.

Cut the tool hole with a Forstner bit or a hole saw.

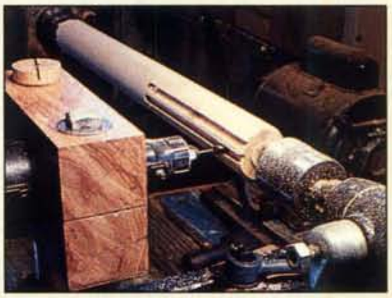

Drill holes for the mounting post and clamping bolt.

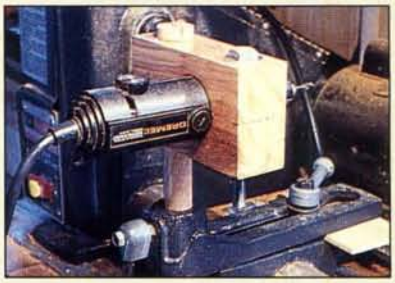
Kerf cut the block so it intersects the tool hole.



by Dana Martin Batory

A special feature of many wood lathes is a spindle pulley equipped with equally spaced holes, usually 36, for indexing and calibrating fluting and mortising tools that operate parallel to the stock. I made this mount to fit my Craftsman tube–bed lathe. This mount holds a variable–speed Dremel MotoTool, but anything similar will work, even a die grinder. Adapt the plans to fit the tool's diameter. This mount fit in my lathe's 7/8" diameter toolrest post hole. These holes vary, so check your lathe beforehand.



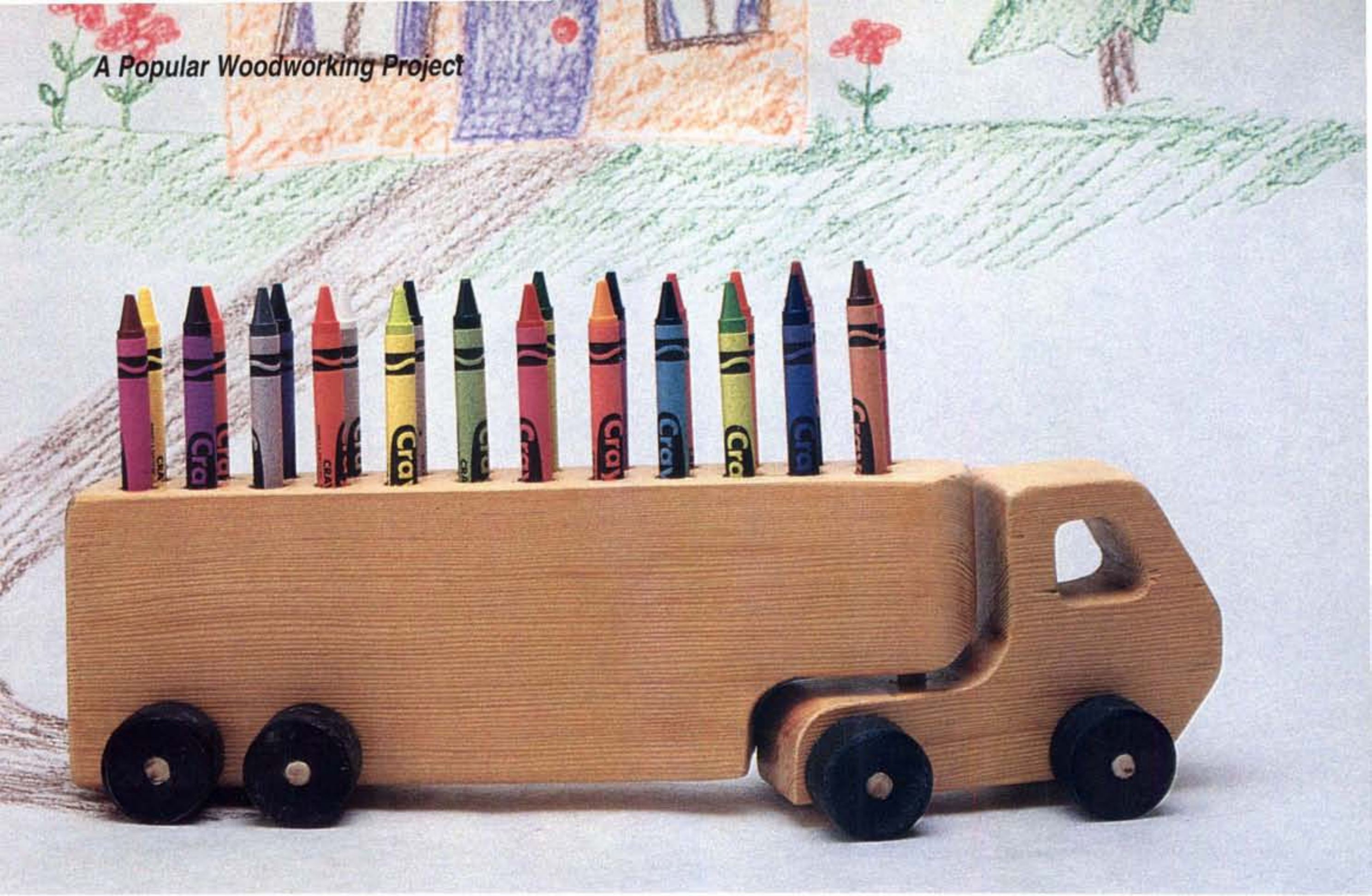


Select a sound hardwood block and cut it to 1⅝" X 3" X 5"; then lay out the lines and circles shown in photo 1. Drill the side hole using a 1⅞" Forstner bit, a holesaw, or a circle cutter. Prevent splintering by drilling from both sides, or back up the piece with scrap. Clamp the block to the drill press table and drill the top holes from both sides. Kerf the block with a band or hand saw so it intersects the hole.

Cut the post from a 7/8" dowel and slip it through the block; then drill two 3/16" holes completely through the block and the dowel rod. Cut the pins slightly longer than the predrilled holes, apply glue, and drive them in. Trim the pins after the glue has dried, and sand and varnish the mount.

Use a bolt, washer and a tee–nut to lock your tool snugly into the mount—not too tight or the motor housing may split. Place a bit in the tool and slip the post into the lathe's toolrest post hole. Move the tailstock so it and the bit are next to each other. Trim the post so the center of the bit and the tailstock are on the same horizontal plane. Leave enough of the post for up and down adjustments so you'll be ready to make special cuts.

The bit, toolrest and mount must move parallel to the stock. Move the toolrest back and forth to cut flutes and mortises, and clamp a stop block to the bed for repetitive length cuts. Take several light cuts rather than one deep one. PW



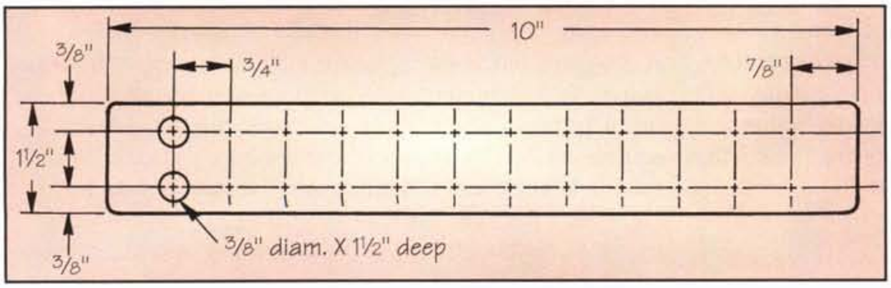
Crayon Truck

by Jerry Marchese, Jr.

The trailer and cab of this colorful caddy can be made from a single 12½" length of 2 x 4. Transfer the full–size pattern from the PullOut™ Plans to your stock and cut out the trailer and cab profile. Drill twenty–four ⅜" diameter holes 1½" deep in the top of the trailer as located in the Figure below. The holes are ¾" on center. Widening the tops of the holes makes it easier for kids to slip in the crayons. Use a countersunk or a conical grinder.

Jerry Marchese, Jr. *works wood in Jonesboro, Georgia.*

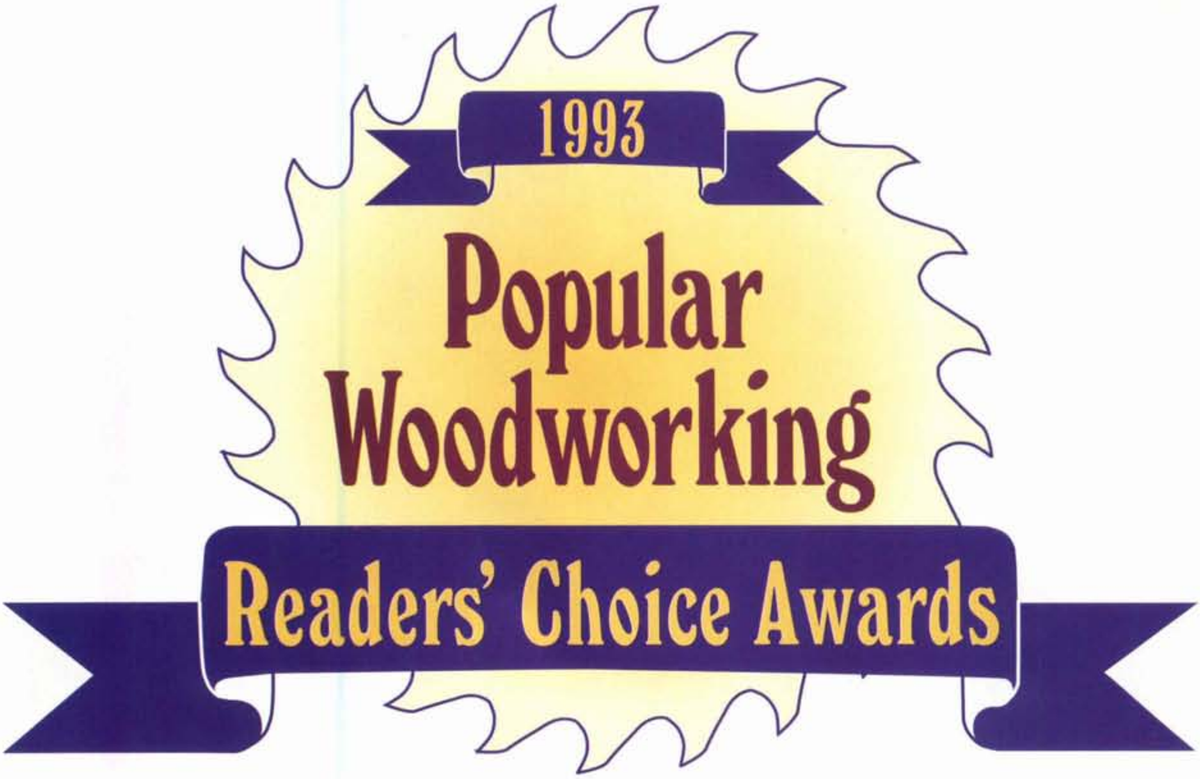
To cut out the cab window as located on the PullOut™ Plans, use a scroll saw, jig saw, or a hand–held coping saw. Drill a hole wide enough to easily slip the blade through. Locate and drill 5/16" holes for the fifth wheel. Glue the dowel in the hole in the trailer.



Locate the axle holes from the PullOut™ Plans and drill 19/64" holes for the ¼" diameter axles. Toys for small children should be safe and fun, so ease all edges with a ¼" *roundover* bit in the router, or use sandpaper.

Make the eight wheels with a 1¼" diameter hole saw in ¾" stock or you can purchase them from Cherry Tree Toys: 1-800-848-4363. Depending on the wheel width, cut the four axles to length from ¼" dowel stock. Paint the wheels black, and when dry, glue them to the axles. Load up your truck with a 24 pack of crayons and watch your little artist get truckin'. PW

BY SANFORD WILK



1993 Popular Woodworking Readers' Choice Awards

Welcome to the 1993 *Popular Woodworking* Readers' Choice Awards. We've put together, for your voting pleasure, a list of one hundred of the best tools—five each in twenty different categories. Our team of testers tried over 200 tools, using them in actual work conditions, to determine which would be nominated. We leave it to you, the readers, to make the final decision about the best in each category. After all, you're the ones who'll be deciding what ends up on your workbench; we can only make recommendations. The list of nominees is impressive, to say the least; I think you'll be hard–pressed to make a choice for the best of each category.

Please take the time to fill out the ballot on page 89, tear it out and send it in—the postage is already paid. If you don't want to tear a page out of your magazine, you can photocopy the ballot, but you'll have to spring for an envelope and postage. Either way, it will be worth your while to vote, because we have over a hundred power tools, accessories and gift certificates to give away by random drawing of the returned ballots. Only those who vote and return the ballot will be eligible. There isn't much time, though; ballots must be postmarked by December 1, 1992. As an added incentive, we will give away belt sander cleaning sticks from Colovos Company to the first 500 entries we receive, in addition to entering them in the drawing for the other tools.

The winning tools will be discussed in more detail in the next issue of *Popular Woodworking*.

We'd like to thank the manufacturers who provided samples for testing. I would like to especially thank the following companies for providing merchandise for the random drawing: Atlas Copco, Bosch, Campbell–Hausfeld, Delta, DeVilbiss, DeWalt, DML, Elu, Emglo, Freeborn, Freud, General Manufacturing, Hitachi, ITW Paslode, Jet, Leichtung, Metabo, Milwaukee Electric Tool, Numark, Porter–Cable, Powermatic, Quik Drive, Ryobi, Senco, Skil, Systematic, Trend–Lines, Vermont American and Wisconsin Knife Works.

Employees and contractors of EGW Publishing and the nominated tool manufacturers are not permitted to vote or participate in the random drawing. Winners of the drawing will be notified by *Popular Woodworking* and all gifts will be shipped directly by the manufacturers.

As you can imagine, the testing and writing that goes into an undertaking like this is nothing less than mind–boggling. I want to extend thanks to several people who made the undertaking possible. A special thanks to S. Beaudry, the world's greatest field–testing coordinator, and P. Buben, my business partner—who operates without a partner when I take on these projects. And of course, all the PR, R and D and marketing folks at all of the manufacturers—without whom this article would not have been possible. Also, Janis Sullivan, Liz Wagner and you, the readers of *Popular Woodworking* who make the effort worthwhile.

Sanford Wilk, *a builder and organic architect in Boston, Massachusetts, heads a team of craftsmen who evaluate tools under actual working conditions.*

CORDLESS DRILLS

Atlas Copco (AEG) ABSE 15S

Among the 12–volt competition this unit is considered the heavyweight contender. It features a $^{1}/_{2}$" chuck with dual speed range, variable–speed (0 to 1100 rpm's) and includes such extras as a built–in light and a ten–position clutch.

DeWalt 945K

This 12–volt drill/driver has both dual speed range and variable speed (90 to 1300 rpm's). The chuck is keyless, but what sets the unit apart is its Versa Clutch™. This feature makes the unit a screw gun with an incredible clutch range.

Metabo 0126

This German made tool is a keyless, dual–range, variable–speed (0 to 850 rpm's) unit. The included charger is an electronic marvel with diagnostics, and it fills the 12–volt battery in ten minutes or less. A six–position clutch and rugged construction tops it off.

Porter–Cable 9851

This keyless chuck drill is a variable–speed unit (0 to 400 rpm's) with an electronic switch. The 12–volt battery pack provides some of the highest torque in the industry. The drill comes with a metal carrying case.

Ryobi TFD–220VRK

This keyless 12–volt unit has incredible torque ratings—we've used it to send huge lag bolts into chestnut. An electric brake and variable speeds (0 to 1300 rpm's) coupled with a six position clutch, means more versatility in the woodshop.

RANDOM ORBIT SANDERS

Atlas Copco TXE150

The 6" pad on this sander incorporates dust collection that sends particles into a side bag or, you can attach it to your shop vac. It offers variable speed between 8000 and 11,000 opm's and the electronics keep the speed constant under load.

Bosch 1370DEVS

This unit has just about the widest range of accessories available. With electronic feedback circuitry and soft start, the tool is a pleasure to work with. The drive system is reversible, so you can go beyond the variable–speed control should you need the power.

Milwaukee 6126

This company's tools are famous in the industrial sector for their durability, and this 5.5 amp machine looks like it'll live up to the reputation. It's got a paddle switch and can be easily converted to a 6" machine by switching the pad and making a counterweight adjustment.

Porter–Cable 7336

This right–angle sander is one of the pioneers and now has the added benefit of a 6" pad. The variable speed range is from 2500 to 6000 opm's. The company has added the options of a dust collection system and hook–and–loop paper.

Ryobi RS 115

This unit is variable from 0 to11,000 opm's. It has a built–in dust extractor with a unique Filter Flo™ rigid collection box that's made of a kind of plastic cheese cloth. A 2 amp motor powers the $4^{1}/_{2}$" pad.

JIG SAWS

Atlas Copco BSPE100

This jig saw has electronic feedback circuitry to keep you at the right speed (450 to 3200 spm), orbital action, as well as a vacuum accessory kit for dust extraction. The 4.6 amp motor is more than ample giving this unit the highest power-to-weight ratio in its class.

Bosch 1582DVS

Besides dust-extraction, a nicely crafted cast aluminum foot plate, orbital action and variable-speed control (500 to 3100 spm), this tool has the fastest and easiest way to change blades. A quick turn of the top handle locks the blade into position.

Makita 4302C

Not only does this unit have electronic control and orbital action, but it also has a full 1" stroke, a six-stage, variable-speed control (1000 to 3000 spm) and soft start. It takes both universal and bayonet blades. In addition, it's got some of the finest ergonomics in its class.

Metabo EP565

Electronic feedback circuitry keeps the saw at the selected speed even under a load. The unit also incorporates variable speed (500 to 3000 spm), full orbital action and beautiful German ergonomics. It's the most powerful saw in its class with a 5 amp motor.

Porter-Cable 7549

This jig saw features electronics and a variable speed range that goes from 500 to 3200 spm. The potent 4.8 amp motor and the unique blade guide-blocks provide quick, yet accurate cuts—even on tight turns. A universal blade clamp lets you install any blade available.

BISCUIT JOINERS

DeWalt DW682K

The unique fence on this tool not only does the 0° to 90° stuff, but uses rack-and-pinion gearing for smooth operation and precision. This unit can be clamped or screwed to a bench top, and the 6.5 amp motor provides plenty of cutting torque.

ELU 3380

Not only can this unique joiner cut the typical biscuit slot, it also offers the enhanced versatility of being able to do spline joints and parallel scribing. Fine adjustment knobs set the depth of cut and there's a graduated scale that's set for all three biscuit sizes.

Freud JS100

This is one of the simplest machines to align and use. Though the fence isn't variable, it does allow cuts at flush, 45° and 90°. The head is die cast, not stamped, so accuracy is retained and durability dominates.

Porter-Cable 555

This belt driven biscuit joiner offers a variable-tilt fence that runs the full range from 0° to 90°. The depth adjustment mechanism offers three preset positions for the different sized biscuits and allows for fine adjustment.

Ryobi JM100K

This machine's fence is capable of any angle up to 180° and offers three positive stops at 45°, 90° and 135°. The vertical fence has a rubber face so it won't mar the work piece. Dust collection is built into the unit and the 5.3 amp motor is more than enough power.

ROUTERS

Bosch 1615EVS

This superb 3¾ hp plunge router has electronic feedback circuitry and a five–position variable–speed control. Bosch has included an ultra–fine depth adjustment and the preset turret offers eight adjustable positions.

Elu 3338

These guys invented plunge routers, and it shows in the ergonomics of this machine. The 2¼ hp motor is powerful enough for most operations yet it only weighs a little over 11 pounds. The unit incorporates electronics and variable speed (8000 to 20,000 rpm's).

Hitachi M12V

This ½" heavy–duty router incorporates electronics and variable speed (8000 to 20,000 rpm's). There's soft start and a 15 amp, 3¾ hp motor that gives this plunge router excellent power. The turret has three steps, two of which are adjustable.

Porter–Cable 7539

This is a five speed production router with 3¾ hp worth of raw power. It features electronic soft start and a plunge depth of 3" The plunge bearings are lined with Teflon™ so the action is smooth, and the post springs are sealed to protect them from dust.

Skil 1875EVS

Skil enters the production router class with an electronic plunge router that offers 2¼ hp and has an easily accessible variable–speed (10,000 to 23,000 rpm's) control. Soft start is also incorporated and the handle grips have the feel of a good circular saw.

ROUTER BITS

Bosch

Known as a woodworking standard across the country, these bits are offered in a vast array of shapes, sizes and shank diameters. A thick carbide edge is carefully applied to the bit body so it can take the strain of constant everyday use.

Carb Tech

One of the best things about these bits is that if you're ever dissatisfied, you can return them to Trend–Lines for replacement or refund. This doesn't include resharpenings, of course, but I don't know of any other bit manufacturer that offers such a guarantee.

Freud

This Italian company develops and manufactures their own carbide. All bits are computer balanced and have anti–kickback bodies. The carbide–to–body brazing method involves three types of alloys that help with heat dissipation and improve impact resistance.

Porter–Cable

Based in Tennessee, Porter–Cable not only offers routers and other find woodworking tools, but also has a wide range of well made carbide router bits. Their production bits are manufactured with a micro–grain carbide that wears extremely well.

Vermont American

These carbide bits incorporate radial relief to eliminate friction and chatter, as well as steep shear and high hook angles for fast chip clearance and quick feed rates. The shanks are triple tempered and promise to last long.

COMPRESSORS

Campbell, Hausfeld CI0530800H

This a very serious two stage compressor whose cast iron composition assures a very long life span. The optimally balanced ductile iron crankshaft provides smooth operation, and at 175 psi the unit puts out an incredible 17.4 cfm.

DeVilbiss IR5E60VAD

This single stage aluminum machine differs from the heavier cast iron beasts, but also offers economy. The 15–amp motor provides the pump with enough power to put out 10.2 cfm at 90 psi. The 60 gallon tank offers the storage capacity that a small woodshop needs.

Emglo W5B–80

With over 30 years of experience in manufacturing compressors, it's no wonder that these folks produce such a nice 80 gallon machine. At 175 psi, this pump gives you 17.5 cfm making this one of the most efficient machines out there.

Grainger 5Z628

With 13.7 cfm at 175 psi this unit isn't exactly a lightweight, and the V–style pump incorporates cast iron cylinders that last. Specially designed stainless steel valves float free and eliminate internal stresses on this two stage machine.

Sears 17735

With its 80 gallon horizontal tank, this two stage compressor can deliver a whopping 15.5 cfm at 175 psi. The head is aluminum with cast iron sleeves in the cylinder interiors. It comes with a built–in pressure gauge, check valve and shutoff valve.

FINISH NAILERS

Bostitch N60FN–2KIT

This kit comes with lubricant, an assortment of fasteners and a steel carrying case. It shoots between 1 1/4" and 2 1/2", 15–gauge fasteners. The magazine holds 100 nails and the nose has a quick release, so the tool is instantly ready for the next shot.

Duofast HFN–880C

This 15–gauge nailer holds 100 fasteners in its straight magazine. It drives nails from 1 1/2" to 2 1/2" long and you can buy nails that are either blunt or chisel pointed. You can also choose between steel or aluminum nails—something not all manufacturers offer.

Hitachi NT65A

This straight magazine nailer is a 16–gauge unit that shoots fasteners between 3/4" and 2 1/2" in length. It weighs only 4.6 pounds, and it holds 150 fasteners so you're not constantly reloading.

Paslode Trimpulse™

This is a cordless finish nailer that shoots fasteners up to 2 1/2" long. It's cordless because it uses an internal combustion engine that uses a nicad battery with a butane gas cylinder. It can drive a nail into some hardwoods that typically resist other nailers.

Senco SFN1

This 15–gauge nailer shoots fasteners that most closely resembled ordinary finish nails; its magazine holds 104 of them from 1" to 2" in length. It also features one of the best quick–clear tips for times when a nail becomes jammed.

BAND SAWS

General 490–1

It's got dynamically balanced wheels and a very smooth table surface. A built–in blade tension indicator gives the operator information that helps to extend blade life. The table is mounted on dual trunnions for excellent rigidity at any angle.

Hitachi CB 75F

This saw accepts blades from $\frac{1}{4}$" wide all the way up to a 3" Stellite–tipped blade and has no competition in this class for resawing. It has a maximum cutting height of $11\frac{13}{16}$" and there's rack–and–pinion gearing for both the fence and the guard.

Reliant DD90

This is a 1 hp, 14" band saw that gives you the option of four different speeds (625, 1061, 1683 and 2578 sfm). Its $13\frac{3}{4}$" X $13\frac{3}{4}$" cast iron table is supported by dual trunnions. It has a $6\frac{1}{4}$" capacity under the guides and offers good economic value.

SCMI S45

This 18" saw offers 10" of clearance under the guides, allowing for some pretty healthy resawing. The drive wheels are balanced cast iron, but the housing is composed of heavy welded steel plate that's rigid but more forgiving than typical cast iron housings.

Sears 24395

With a $1\frac{1}{2}$ hp motor, this is one of the most powerful resawing tools out there. You can choose from four speeds (270, 700, 1480, or 3800 fpm) and there's 11" of cutting height and over 17" of throat depth. The wheels are aluminum and the body is steel.

DRILL PRESSES

Delta 11–090

Delta calls this machine a Radial Drill Press. Its head swivels and tilts, and the ram can travel $11\frac{1}{2}$". The $\frac{1}{2}$" chuck travels at five speeds (580, 940, 1560, 2480 and 2450). An auxiliary work table is available for working on large pieces.

General 34–01M

Typical to all of General's line, the machining on this tool is immaculate, and the 11" X 16" table is made of seasoned cast iron that's second to none. There's six speeds to choose from, and the graduated depth–gauge indicates hole depth.

Numark 60–276

The cast iron table on this machine runs up the $3\frac{5}{16}$" diameter column on rack–and–pinion gearing and tilts 90° to the left or right. With a $\frac{3}{4}$ hp motor and the versatility of 16 speeds, you can see why many hardware store chains buy this and put their name on it.

Reliant DD55

This 17" floor model with 12 speeds (340 to 2800 rpm's), incorporates a $\frac{5}{8}$" chuck that's really beefy. The $13\frac{3}{4}$" table tilts and rides a $3\frac{1}{8}$" diameter column. The $\frac{3}{4}$ hp motor has plenty of power, and the price makes it a good alternative to more expensive machines.

Sears 21321

This 20" drill press stands at the top of the Sears line and it offers such niceties as rack and pinion gearing for table height adjustment and a huge $16\frac{5}{8}$" X $18\frac{5}{8}$" work table. The $\frac{3}{4}$" chuck, $4\frac{1}{4}$" of spindle travel and 12 speeds spells out true woodshop versatility.

JOINTERS

General 1180–1

This 6" jointer is rigid and extremely accurate. The 42$^{1}/_{2}$" tables give plenty of room to work, and the closed cabinet base adds to the stability. A one piece steel cutterhead holds three knives and chip breakers for a cut as smooth as the table surfaces.

Reliant DD40

Among 8" machines, this is one of the more affordable tools on the market. It offers the big machine features of a magnetic starter, cast iron tables with 66" of work surface, a triple–blade cutterhead and a 1$^{1}/_{2}$ hp motor.

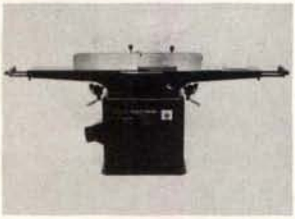
Ryobi JP155

This is the only variable speed (16,000 to 32,000 cpm) bench top jointer on the market. It offers features like a 6$^{1}/_{8}$" width capacity and a fully adjustable fence that tilts up to 45° for chamfering operations.

SCMI FS35

Though this is actually a combination machine with a built–in planer, the jointer is nothing to squawk at. The cutter head is 12" wide and at 49 cpi you definitely have a smooth piece of stock after the run. This machine is also offered with a built–in mortiser.

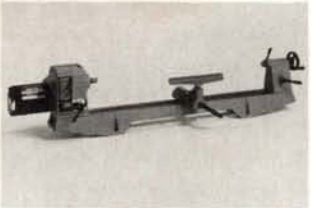
Sears 20651



When you combine the 66" long table on this jointer with the roller extensions, a full 88" of work surface is available to the woodworker. The cutter head is dynamically balanced, and it offers up to 8$^{1}/_{8}$" of cutting width.

LATHES

Delta 46–700



This benchtop lathe offers variable speeds (500 to 2000 rpm's) and a 12" capacity. The unique pivoting head can be set 90° to the bed, so you can turn bowls up to 16" in diameter. The hollow tailstock feature permits long hole boring.

General 160–2

This is a cabinet–based lathe with variable speed (500 to 3000 rpm's) that's controlled by a front lever. It's a 12" machine with plenty of brawn and 38" between centers. The tailstock is self ejecting and the tool rest adjusts quickly and easily.

Grizzly G1495

This unit is a bargain when you consider the standard accessories like an 8" disc sander and flapper sanding wheel. This machine has a 14" swing and 36" between centers and variable speeds from 560 to 3500 rpm's. A $^{3}/_{4}$ hp motor provides good power.

Powermatic 90

This unit has a 12" swing, 38" between centers and variable speeds (330 to 2100 rpm's). Composed mostly of cast iron, it's one of the heaviest lathes on the market. The spindle is dynamically balanced to further reduce vibration, and a locking pin eases faceplate removal.

SCMI T–124

This copy–capable machine can actually take square stock to finished profile in a single pass, and steady it while doing so. With four speeds and a maximum working diameter of 7" with the copier in place, this Italian–made production lathe can handle some pretty large jobs.

SCROLL SAWS

Delta 40–560

This 16" unit offers two speeds (850 and 1725 spm) and a unique blade tensioning system that has an instant release lever built in. The frame and table are both cast iron, and you can scroll saw stock up to 2" thick.

Reliant DD26

You can cut stock up to 2" thick with this machine, and the blade mount accepts both pin and standard types. Trend–Lines includes a stand and casters, and the 26" throat allows you to cut to the center of a 52" workpiece. The table tilts from 0° to 45° to the left.

Ryobi SC160

Among benchtop tools, this 16" saw is worthy of serious consideration. It takes both blade types, and the 1.6 amp motor is powerful enough for small projects. A built–in blower and the blade storage compartment makes this a convenient setup for the small shop.

Sears 23640

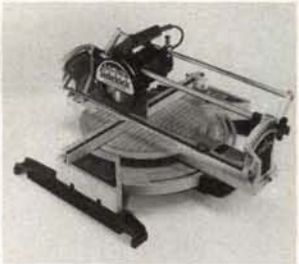
This tool's huge 16" X 16" cast iron table tilts 45° and makes intricate bevel cutting a bit easier. At 90° this machine cuts stock up to 2" thick and the variable speed (30 to 2000 spm) control is coupled with a beefy 1.3 amp motor—this is a heavy duty contender.

Skil 3330

This scroll saw is one of the best options for the small woodshop. Though the motor is only 1.6 amps, it's an induction type that offers plenty of cutting power. A dust extraction system and air blower are built in, as well as a storage compartment for your blades.

SLIDING MITER SAWS

Delta Sidekick™ 33–060



With this saw you can slice $1\frac{3}{4}$" thick stock up to 12" wide at 90°. The 12 amp motor makes easy work of stubborn hardwoods. The dual rods are constructed of rigid stainless steel, and there's an electronic blade brake for safety and convenience.

Hitachi C8FB

Hitachi was the pioneer of dual–rod technology, and it's also the benchmark. The $8\frac{1}{2}$" blade is powered by a 1.4 hp motor that's hard to beat, and its electric brake works like a champ. The unit weighs 37.4 pounds, and it cross cuts up to $2\frac{9}{16}$" X 12" at 90°.

Makita LS1011

Even though it's a single–rod system, the manufacturer offers up this unit with a 10" blade that has incredible cutting capacity. The machine handles a $2\frac{5}{16}$" X 12" piece of stock without having to flip the board.

Ryobi TSS220

This dual–rod compound slider glides with ease, and the rods are protected from damage by a steel cover. The $8\frac{1}{2}$" blade is powered by a 10 amp motor that suits it just fine. Thanks to aluminum alloy construction, it weighs about 44 pounds.

Sears 23488

This dual–rod $8\frac{1}{4}$" slider is really nice. The direct drive motor has a built in electric brake, and you can cross cut a $2\frac{1}{2}$" X 12" piece of stock at 90°. The automatic lift guard is well designed and you can miter up to 50° to the right.

SHAPERS

Delta 43–355

With a 1½ hp motor and two spindle speeds, this unit can take on a variety of knives and applications. The fence is a series of layered fiberglass strips that conform to the contour of the knife; dust collection is easier and it provides more protection for the operator.

General SS–032

The castings on this 5 hp machine are absolutely beautiful, and the workmanship is reminiscent of a bygone era. The fence adjusts easily, and there are four feed rollers on the unit to assure accuracy. There's also a foot brake for the operator's convenience.

Jet JWS–18HO

This open base unit incorporates a heavy duty cast iron table and independently adjustable fences. There's a built–in dust chute. The 1 hp dual voltage motor is hooked up to a reversing switch.

Powermatic 1270110

This tool comes with a 1¼" spindle, and there are optional ½" and ¾" interchangeable spindles. A powerful 3 hp motor turns the cutters at two speeds (7000 and 10,000 rpm's). The top is cast iron. Magnetic controls and a reversing switch are also standard.

SCMI T3T

This is a full–sized cabinet based shaper with a dual rod sliding table. It offers three spindle speeds and also runs in reverse. The fence has a micro adjustment feature, and the entire spindle assembly is dynamically balanced for vibration–free shaping.

SHAPER KNIVES

Bosch

Because these cutters have a full ⅛" of carbide on them they absorb a lot of shock and can be resharpened many times. Over 60 profiles are offered. Bosch knives have enjoyed a well deserved reputation through the years.

DML

The combination of industrial grade carbide, milled bodies and close tolerances of these cutters provide a smooth cutting edge that's a joy to work with. In addition to their standard line, the folks at DML will manufacture custom profile knives as well.

Freeborn

One of Freeborn's specialties is a Tantung™ metal knife that produces an almost sand–free finish. Based in the United States, Freeborn has one of the most advanced manufacturing plants in the world. In fact, they supply many other manufacturers with knives.

Freud Performance System

This system was developed to save the woodworker money. It's versatile cutterhead accepts a wide variety of knife profiles that can cut over 60 different variations.

WKW Badger™ Insert Shaper Tooling

This is a knife insert system that offers the versatility of multiple knives without the hefty investment. What sets this system apart is its tolerances—an incredible .0005". The company can custom–make any profile for material that's 1" thick or less.

TABLE SAWS

Dayton 3Z997

This beautiful machine can be found in the catalog pages of Grainger. The cast iron work surface measures out at a whopping 48" X 30" if you count the standard extensions. The 3 hp motor can't be stopped or slowed, and it powers a 12" blade.

Delta 34–4444

When you combine the 20" X 27" cast iron table with the steel extensions, this machine offers a 40" wide work surface. The Jet Lock™ and Micro Set™ fence system lock the front and rear rails. A rack and worm gear blade elevation mechanism makes for easy adjustments.

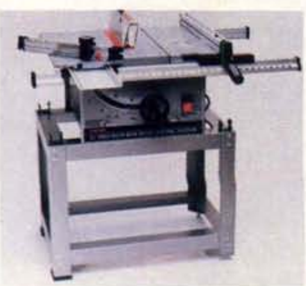
General 350–1

An incredibly beautiful machine that's made of the finest cast iron, General offers a scoring accessory that makes for mighty smooth cuts, especially on laminated materials. This 10" saw has oversized cranks that turn easily, and a good, practical guard.

Hitachi C 12Y

This unit features a full–sized dust collection port, cast iron rip fence, a hand brake, and a spindle lock for easy blade changes. With a rip capacity of 35" to the right of the blade and a maximum cutting depth of 4$^1/_8$" at 90°, you can see why we like this unit.

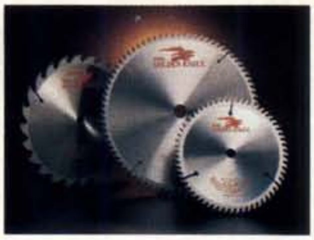
Ryobi BT–3000



This is the most unusual system for a small workshop that we've ever seen. Its sliding table works on either side of the blade. The internal dust collection system extracts most of the dust without assistance from a collector or shop vac.

SAW BLADES

DML



Dyanite™ is the carbide that DML uses on their Golden Eagle™ line of blades—it's stronger than C4 grade carbide. We tested the blades, and they lasted four to five times longer than the hardest Tungsten carbide blade teeth we could find.

Freud

These blades are produced from laser–cut blanks in Itlay. Freud uses a micro–grain carbide that's a mixture of carbon and tungsten powders, the unique carbide is more dense than average, and holds an edge much better.

Systimatic

Every Systematic blade is hand hammered to produce results that machine–manufactured blades can't replicate. They use several grades of carbide for different applications. These blades are available in regular and thin–kerf design and 4" to 38" diameters.

Vermont American

VA makes a Premier Plus™ line that in-corporates Dyanite™ teeth. The blanks are fully hardened and designed for continuous duty. All of the blades in this line are tensioned. You can choose every tooth style from alternate top bevels to triple– chip.

Wisconsin Knife Works

WKW blades are made of the finest steel plate available, and last longer with less run–out. The carbide is a special alloy and is available in three different grades, depending on your cutting application. Tooth brazing is checked with infrared equipment to assure a 100% bond.

THICKNESS PLANERS

Delta 22–540

This four column benchtop planer handles stock up to 12" in width and 6" thick. A powerful 15 amp motor runs the cutter head at a rate of 16,000 cpm for a smooth finish. The two knives are reversible for longer life.

Hitachi P100F

This fine four column planer has a 12$^5/_{32}$" maximum cutting width. This machine incorporates a 15 amp power head that pulls stock through at 26 feet per minute. There is also a depth–gauge to determine the maximum cut based on material width.

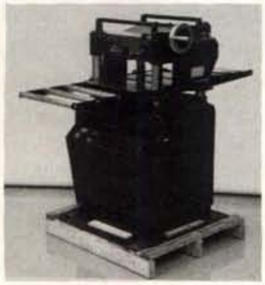
Reliant DD37

This 15" unit has an adjustable power–feed clutch lever that starts and stops the feed without interrupting the power. The three–cutter head and 3 hp motor put out 13,500 cpm. These folks even throw in the dust collection hood usually offered as an "accessory."

Ryobi AP12

This planer has slotted blades so if you nick one, you can still get good cuts by shifting the blades a hair. There are no carbide knives offered by the company for this machine, but the high speed steel we tested performed like carbide thanks to the planer's unique design.

Sears 23374



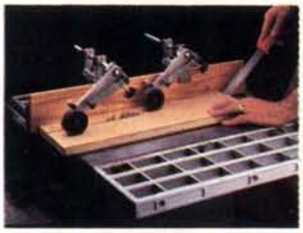
This is a new item for Sears, and it's one of the finest 15" cabinet based planers out there. A lot of it is cast iron, and the triple infeed and outfeed rollers make stock transmittal go smoothly. A three–knife cutter head and an adjustable feed rate (16 and 20 fpm) give you good control.

MOST REVOLUTIONARY

DeWalt DW990 Charger

This is a charger that not only recharges DeWalt batteries, but also handles just about every other battery out there. It charges in 17 minutes or less and is computerized so it can't overheat. The charger's brilliant engineering actually extends battery life.

Leichtung Anti–Kickback Holddowns



With all the talk about safety, it's nice to know that somebody actually makes an item that not only protects the operator, but is easy to use. These are the best anti–kickback devices you'll find, and the arms are reversible so you can adjust your fence position.

Quik Drive QD200

This self–feeding screw gun holds 167 fasteners and allows the operator to drive them in sequence—the same way pneumatic nailers send home nails. In addition, the screws are square drive for accurate placement and chatter elimination.

Porter–Cable OMNIJIG™ Model 7116

Porter–Cable took their popular dovetailing jig and increased its versatility by bringing the length up to 24". The unit accepts stock from 1/2" to 1" thick. A single lever controls the cam and allows one–handed operation for easy board positioning.

Stanley's Lighted Torpedo Level

Ever tried hanging and leveling something in an area with poor lighting? Or how about leveling the inside of a dark cabinet? Well, the folks at Stanley modified their standard torpedo level so the vials light up. Now you don't have to hold a flashlight in your teeth.

THE 1993 READERS' CHOICE AWARDS OFFICIAL BALLOT

Please vote for only one nominee in each category. If you own a tool in the category (it doesn't need to be one of the nominees listed) check the box to the right of the category. That way, if we pull your name in the random drawing you won't be sent something you already own. We've omitted the box for Router Bits and Saw Blades—we figure everyone can use extras in these categories. Be sure to fill out your name and address at the bottom, fold the ballot so our address shows on the back, and seal it with a bit of tape. The ballot must be postmarked by December 1, 1992 for your choices to tabulated and for you to be eligible for the drawing.

Cordless Drills ☐
- ☐ Atlas Copco ABSE15S
- ☐ DeWalt 945K
- ☐ Metabo 0126
- ☐ Porter–Cable 9851
- ☐ Ryobi TFD 220VRK

Random Orbital Sanders ☐
- ☐ Atlas Copco TXE 150
- ☐ Bosch 3283DBS
- ☐ Milwaukee Electric 6126
- ☐ Porter–Cable 7336
- ☐ Ryobi RS115

Jig Saws ☐
- ☐ Atlas Copco BSPE100
- ☐ Bosch 1582DBS
- ☐ Makita 4302C
- ☐ Metabo EP 565
- ☐ Porter–Cable 7549

Biscuit Joiners ☐
- ☐ DeWalt DW682K
- ☐ Elu 3380
- ☐ Freud JS100
- ☐ Porter–Cable 555
- ☐ Ryobi JM100K

Routers ☐
- ☐ Bosch 1615EBS
- ☐ Elu 3338
- ☐ Hitachi M12V
- ☐ Porter–Cable 7539
- ☐ Skil 1875EVS

Router Bits
- ☐ Bosch
- ☐ Carbtech
- ☐ Freud
- ☐ Porter–Cable
- ☐ Vermont–American

Air Compressors ☐
- ☐ Campbell–Hausfeld
- ☐ Devilbiss IR5E60VAD
- ☐ Emglo W5B80V
- ☐ Granger 5Z628
- ☐ Sears 17735

Finish Nailers ☐
- ☐ Bostitch N60FN-2KIT
- ☐ Duofast HFN880C
- ☐ Hitachi NT65A
- ☐ Paslode Trimpulse
- ☐ Senco SFN1

Band Saws ☐
- ☐ General Mfg 490-1
- ☐ Hitachi CB75F
- ☐ Reliant DD90
- ☐ SCMI S45
- ☐ Sears 24394

Drill Presses ☐
- ☐ Delta 11-090
- ☐ General Mfg 34-01M
- ☐ Numark 60-276
- ☐ Reliant DD55
- ☐ Sears 21321

Jointers ☐
- ☐ General 1180-1
- ☐ Reliant DD40
- ☐ Ryobi JP155
- ☐ SCMI FS35
- ☐ Sears 20651

Lathes ☐
- ☐ Delta 46-700
- ☐ General Mfg 160-2
- ☐ Grizzly G1495
- ☐ Powermatic 90
- ☐ SCMI T124

Scroll Saws ☐
- ☐ Delta 40-560
- ☐ Reliant DD26
- ☐ Ryobi SC160
- ☐ Sears 24640
- ☐ Skil 3330

Sliding Miter Saws ☐
- ☐ Delta 33-060
- ☐ Hitachi C8FB
- ☐ Makita LS1011
- ☐ Ryobi TSS220
- ☐ Sears 23488

Shapers ☐
- ☐ Delta 43-355
- ☐ General Mfg. SS032
- ☐ Jet JWS-18H
- ☐ Powermatic 1270110
- ☐ SCMI Mini–Max T3T

Shaper Knives ☐
- ☐ Bosch
- ☐ DML
- ☐ Freeborn
- ☐ Freud Performance System
- ☐ WKW Badger Insert Shaper

Table Saws ☐
- ☐ Dayton 3Z997
- ☐ Delta 34-4444
- ☐ General Mfg 350-1
- ☐ Hitachi C12Y
- ☐ Ryobi BT–3000

Saw Blades
- ☐ DML
- ☐ Freud
- ☐ Systematic
- ☐ Vermont–American
- ☐ WKW

Thickness Planers ☐
- ☐ Delta 22540
- ☐ Hitachi P100F
- ☐ Reliant DD37
- ☐ Ryobi AP12
- ☐ Sears 23374

Most Revolutionary ☐
- ☐ DeWalt DW990
- ☐ Leichtung anti–kickback
- ☐ Quick Drive screw gun
- ☐ Porter-Cable 24" Omni Jig
- ☐ Stanley lighted torpedo level

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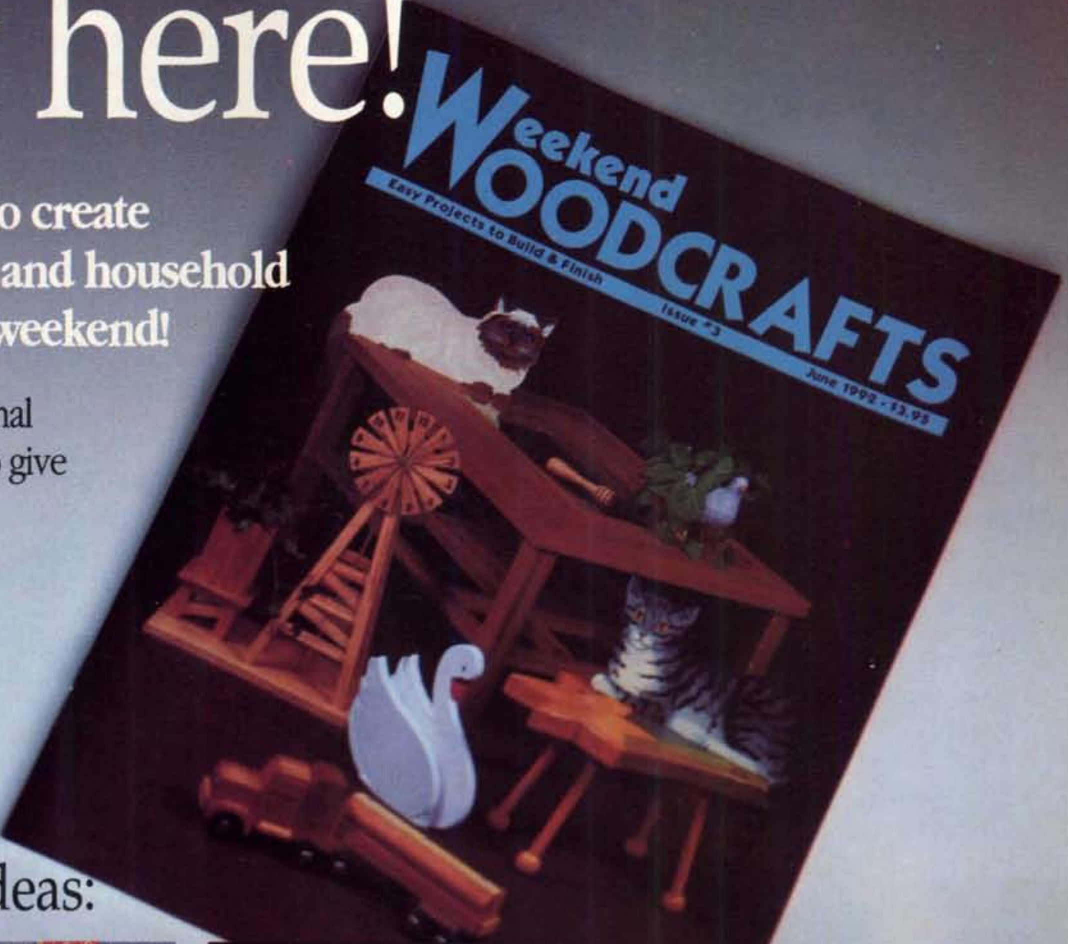

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Book Reviews

by Hugh Foster

Making and Repairing Wooden Clock Cases by V.J. Taylor and H.A. Babb (Sterling Publishing Company, 387 Park Avenue South, New York, NY 10016-8810) 190 pages, hardcover, $29.95

The title suggests that this book appeals to only a small group of woodworkers, but I discovered that it gives detailed instructions about repairing and replacing cabinetry parts too, not just clock faces. Although, the bulk of this well-illustrated text is devoted to repairs, there are chapters about veneering, joinery repair and clock designing too. The authors put the better part of a century of woodworking experience into this volume. Their presentation is complete and clear—I think it belongs in every woodworking reference library.

Shaping Wood: A New Woodworking Approach by Douglas Hackett (TAB Books, Blue Ridge Summit, PA 17294-0850) 164 pages, paperback, $14.95

This is a book about stack lamination. The cover photo shows a rustic imitation of a Maloof rocker or a Wendell Castle lamination. Inside, the author shows us how to build the imitation simply in our own woodworking shops. His projects are interesting, his instructions are clear, and his technique for transferring grid patterns is great. I would recommend this volume to everyone.

Outdoor Furniture: 30 Great Projects for the Deck, Lawn and Garden by Bill Hylton with Fred Matlack & Phil Gehret (Rodale Press, 33 East Minor Street, Emmaus, PA 18098) 312 pages, hardcover, $26.95

It would really take some doing to come up with a better outdoor furniture book than this one! This book groups its projects into four categories: quick and easy, garden, designer and traditional. The quick and easy designs are slightly stylized versions of redwood furniture that are commonly found in stores—except these designs are attractive. The garden section contains plans for an upscale garden bench, similar to teak models that sell for hundreds of dollars in catalogs. Other garden projects include: an umbrella, a tea trolley, and fancier, more complex tables, chairs and chaises. The text is simple enough to take the complexity out of building these even more advanced designs. The designer category contains southwestern variations of the projects covered in the earlier sections. The traditional section has an updated Adirondack ensemble, a rush-seated porch rocker and an oak porch swing. I highly recommend it.

Dust Collection Basics: Recommendations for Home Shop Systems by Woodstock International, Inc. (Woodstock International, Inc., P.O. Box 2027, Bellingham, WA 98227) 40 pages, paperback, $5.95

Increasing concerns over the health hazards of wood dust make this handbook indispensable. We should all consider installing a dust collection system for more reasons than just neatness—it's a question of health. Building a dust collecting system is a necessity for woodworkers who use machinery frequently. Woodstock is a fitting manufacturer for dust collector duct systems. Their book guides the reader through a complete installation, using parts that can be bought at a woodworking store or through a catalog. Nowhere else have I seen instructions for this type of work treated as thoroughly or professionally.

The Language of Wood: Wood in Finnish Sculpture, Design and Architecture by The Museum of Finnish Architecture (American Craft Council Publications, 40 West 53rd St., New York, NY 10019) 156 pages, hardcover, $39.00

There are about 130 consecutive pages of full-color illustrations that make this book special. Viewing ancient Finnish designs photographed next to their modern Scandinavian counterparts clarifies the design origins. Tools, boats, furniture, art and architecture are all represented in force. There is a section in the back of the book that has each full-size illustration reduced to a single square inch, accompanied by commentary about the photo. The 26 pages of text give the reader furthuer insight into the relationship between Finland and wood. PW

***Hugh Foster** is an English–teaching woodworker in Manitowoc, Wisconsin, and the author of* The Biscuit Joiner Handbook *(Sterling Publishing, 387 Park Ave. South, New York, NY 10016).*

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Calendar

Events of Interest to Woodworkers

If your group is having an event you would like other woodworkers to hear about, please send us all pertinent information at least three months before the opening date. We will publish it for you in *Calendar* free of charge.

MARYLAND

Sugarloaf's Winter Crafts Festival: (12/11-13), Montgomery County Fairgrounds, Gaithersburg, MD.

Contact: Deann Verdier, Director, Sugarloaf Mountain Works, Inc., 200 Orchard Ridge Dr., Ste. 215, Gaithersburg, MD. Tel. 301-990-1400

NEW YORK

Woodturner's Symposium: (6/25-27), at the New York State University, Purchase, NY.

Contact: American Association of Woodturners, Mary Redig, Administrator; 667 Harriet Ave. Shoreview, MN 55126. Tel. 612-484-9094

Woodworking World Show: (1/8-10), at the Hofstra University, 100 Fulton Ave., Uniondale, NY 11553.

Contact: Woodworking World, P.O. Box 796 Plymouth, NH 03264. Tel. 603-536-3768

WBAI Holiday Crafts Fair: (12/4-20), weekends at Columbia University's Ferris Booth Hall, 115th St. and Broadway, New york, NY

Contact: WBAI Holiday Crafts Fair, P.O. Box 889, Times Square Station, New York, NY 10108. Tel. 212-695-4465

MINNESOTA

Woodworking World Show: (1/29-31), Minneapolis Convention Center, 1301 South Second Ave., Minneapolis, MN 55403.

Contact: Woodworking World, P.O. Box 796 Plymouth, NH 03264. Tel. 603-536-3768

NORTH CAROLINA

Woodworking Classes: Woodcarving—Figures (12/6-12), In-the-Round(12/13-19). Woodworking—Hand Hewn Bowls (12/13-19). At the John C. Campbell Folk School, Route 1, Box 14-A Brasstown, North Carolina 28902. Tel. 800-562-2440.

NORTH DAKOTA

Woodworking World Show: (1/15-17), at the Bismark Civic Center, 601 East Sweet Ave., Bismark, ND 58502.

Contact: Woodworking World, P.O. Box 796 Plymouth, NH 03264. Tel. 603-536-3768

OHIO

Woodworking World Show: (1/22-24), Veteran's Memorial Hall, 300 West Broad St., Columbus, OH

Contact: Woodworking World, P.O. Box 796 Plymouth, NH 03264. Tel. 603-536-3768

PENNSYLVANIA

International Lathe-Turned Objects Challenge V: (1/28-4/31), Berman Museum of Art at Ursinus College, Collegeville, PA. Entries must be received by July 10th.

Contact: The Wood Turning Center, P.O. Box 25706 Philadelphia, PA 19144. Tel. 215-844-2188

TENNESSEE

Call for entries: (1/4) entry deadline for national open media competition, "Pattern: New Form, New Function." Submit up to three pieces on 35mm film. $18.00 entry fee. Exhibition will be held (2/26-5/15), At the Arrowmont School of Arts and Crafts, P.O. Box 567, 556 Parkway Gatlinburg, TN 37738-0567. Tel. 615-436-5860

VIRGINIA

Woodworking World Show: (1/8-10), at the Norfolk Scope on the corner of St. Paul and Brambleton, Norfolk, VA 23501

Contact: Woodworking World, P.O. Box 796 Plymouth, NH 03264. Tel. 603-536-3768

GERMANY

World Fair: for Machinery and Equipment for the Wood and Forestry Industries. (5/19-25) Hannover Fairgrounds, Hanover, Germany.

Contact: Hannover Fairs USA, Tel. 609-987-0092

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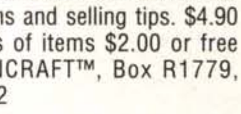

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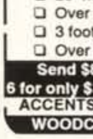

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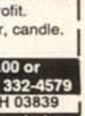

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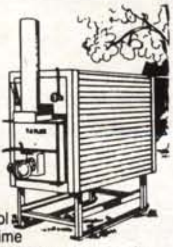

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MACHICHE

by Ken Textor

This is the first of our occasional reviews of underutilized, exotic tropical woods. For a woodworker who usually steers clear of politically charged topics, I'm happy to be taking up the topic of this Central American hardwood. As woodworkers concerned with rainforest protection become more numerous, machiche (pronounced mah-CHEECH) should become as common a woodworking medium as mahogany or rosewood.

General Description

Machiche is one of a huge genus (lonchocarpus castillo) of hardwoods found in the area stretching from southern Mexico to central Brazil where there are dozens of local names for machiche. Though the genus is widely spread, the growing range of the species is confined largely to the Yucatan Peninsula of Mexico and parts of Belize. The trees frequently reach heights of 100 feet or more, with trunks up to 40 inches in diameter and clear of knots and boles for up to 60 feet. They grow on relatively dry lowlands, plains and at moderate elevations. This growing area makes them more readily accessible and more easily harvested without using environmentally damaging cutting practices.

The wood itself is very hard and durable, with a generally straight interlocked grain. When properly kiln-dried, machiche is moderately heavy and stable. It is much like a domestic hard maple in many of its working properties.

In appearance, its striking coloration is generally a very uniform, medium chocolate brown color with a herringbone or tweedy look to the grain pattern. There is also darker brown striping throughout. When finished, the grain pattern throws back light in a slightly different manner depending on your point of view—somewhat like a holograph. The sapwood, however, is rather dull, being a yellowish cream color. It usually accounts for only a small portion of the wood available for lumber and woodworking.

Machiche is extremely rot resistant and basically immune to insect attack, though research into its ability to resist marine borers is incomplete. It is moderately easy to bend under normal steam processes, being resistant to splitting because of its interlocked grain.

Uses of this wood have not been fully explored, though it is commonly found in flooring, railroad ties, heavy construction, fine furniture and trim parts, and in musical instruments. One major acoustic guitar maker is currently considering using machiche extensively.

***Ken Textor** works wood and writes about it in Arrowsic, Maine.*

Working Properties

Working machiche is a pleasure. Despite its interlocked grain, it planes very easily. Though reportedly it can chip and splinter during planing, I did not have this problem except for some tear out when hand-planing.

Planer and saw feeding speeds need to be fairly slow to prevent burning. Sanding is easy and the wood's hardness resists sanding dips extremely well—allowing one to quickly progress to finer grades of sandpaper.

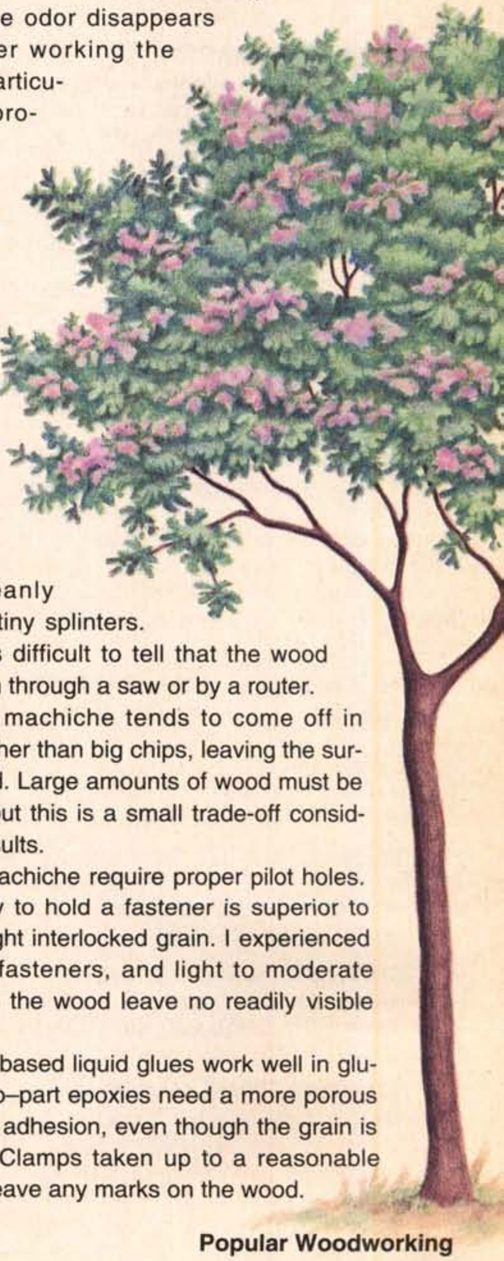
When cut, machiche has a sharp smell, faintly reminiscent of chlorine, but I did not have an allergic reaction to it. The odor disappears immediately after working the wood. It is not particularly dusty and produces normal shavings.

All types of cutting and shaping of machiche produced excellent results. Crosscutting leaves no ragged or chipped edges and the wood rips cleanly except for a few tiny splinters. In most cases it's difficult to tell that the wood has even been run through a saw or by a router.

When turned, machiche tends to come off in small shavings rather than big chips, leaving the surface easily sanded. Large amounts of wood must be taken off slowly, but this is a small trade-off considering the clean results.

Fasteners in machiche require proper pilot holes. The wood's ability to hold a fastener is superior to most, due to its tight interlocked grain. I experienced no splitting with fasteners, and light to moderate hammer blows on the wood leave no readily visible marks.

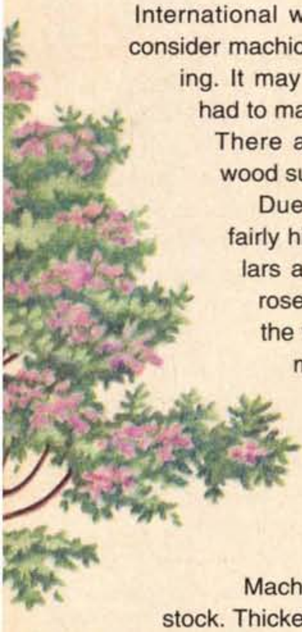
All of the resin-based liquid glues work well in gluing machiche. Two–part epoxies need a more porous surface for proper adhesion, even though the grain is somewhat open. Clamps taken up to a reasonable pressure will not leave any marks on the wood.



Machiche is relatively easy to finish. Water-based polyurethanes raise the grain a bit. Other clear finishes and waxes work well, accenting its colors and straight grain.

The open grain may require some filling, depending on the desired results.The wood is naturally dark with just a clear shellac or varnish, and does not need a darkening stain. A lightening stain requires experimenting to see how it affects the grain. I can't imagine wanting to paint machiche and so cannot report on the results of this kind of finish.

Availability



International wood importers are just beginning to consider machiche as a valuable species for wholesaling. It may be difficult to find at a retail outlet; I had to mail-order the planks used for this report. There are at least a half–dozen mail-order wood suppliers for machiche.

Due to this relative scarcity the price is fairly high. It costs between six and eight dollars a board foot, which is competitive with rosewood, teak and similar exotics. Since the wood is not very rare in its native land, most of the suppliers I talked to said they expect the price to go down as imports of machiche increase. Depending on how the North American Free Trade Treaty is finalized, prices could go down even further.

Machiche is available today in 1 and 2 inch stock. Thicker stock can be special-ordered. I found no veneer supplies of machiche, nor plywood suppliers. Lengths up to 20 feet and widths of 12 inches or more are easily obtained. Quarter sawn wood is usually available in wide and long lengths too; but beware of shipping restrictions. Some shippers will only handle certain sizes and weights in a given load.

For those concerned about rainforest protection, the reports on machiche are very good. Supplies are huge and easily obtained without disturbing other nearby growth. It is harvested largely by indigenous people whose silviculture practices include selective cutting. The local people are generally paid well for their product—given the relative economics of the area. Machiche also meets the standards of the Smart Wood certification program, which is run by the Rainforest Alliance of New York City. PW

Out of the Woodwork

by Jeff Taylor

The Seven Project Shop

My wife never imagined what I'd do to get my shop back.

Our marriage has always been open and communicative, even when I disappear into my shop. We acknowledge our different tastes; she likes jazz, I prefer rock 'n roll. This partnership supersedes all boundaries. What's mine is also hers.

But, ask yourself, in your secret heart, when you contemplate buying a tool, do you immediately discuss its practicality with your spouse? Do you furtively nurse your hunger and devise plots and stratagems until the day it is yours? Do you assume that your significant other really understands your fascination with dead tree parts? Is it okay with you if she goes in your shop looking for kindling? Or is it your shop?

There is an indefinable clarity of mind that strikes when you're in the privacy of your own shop. Woodworking teaches patience, and bestows a rare cunning for following the grain of events. When it comes to situations requiring finesse, the dedicated woodworker is the subtlest beast of the field.

One warm night last summer, Joy looked up from her business records and said, "It looks like I'll need about half the shop." I laughed, "Good one."

"No, it's true; here are the figures." She outlined some brutal math. Her health tea business had been increasing exponentially, and she'd run out of workroom space. She absolutely required another 60 square feet. Her business provided a substantial chunk of our income. I found it suddenly hard to breathe.

It took years to acquire a seven–project shop. One big enough to sustain seven separate woodworking projects at one time. I could laminate a strip canoe and then walk across the room to turn a paddle on the lathe, with five other projects going all at once. It's not pure, sprawling, swing–a–cat space; indeed the shop is packed so tightly with treasured tools that a mouse would get stuck if it left the aisles. To lose 50 percent would cause great spiritual and technical suffering. I gasped inwardly.

I mimed a sad expression: "Actually, it may not be possible to consolidate. See, I have to keep the lathe leeward of the table saw to run them both off counter–rotating pulleys." (When holding deuces, bluff.)

"No problem," she said. "I only want the little west room of our garage." According to a very narrow architectural definition, before I built the carport my shop had indeed been "Our Garage". But the room in question was prime square footage, the only drywalled area, and the area where I keep my wood. The Clean Room, insulated and heated, was filled with chunks of the finest hardwoods. "Anyway, it's a third of the building, not half."

"Okay," she said. "You win. I'll make do with a third." (What compulsion seizes men, to correct the mathematical errors of their wives?) No country at war ever lost territory faster. It would take patience and finesse to get it back.

I made wall racks for wood storage. But most of the wood went overhead between joists in the main section. Under the dead load, they creaked and got iron–hard. They'll hold the approximate weight of a Cadillac, if it's added one stick at a time. On the minus side, getting a piece of wood down is like pulling an elephant on water skis.

During the summer, we worked under the same roof on our different jobs. My coffeepot next to her tea kettle full of licorice root tea. The radio alternately playing golden rock 'n roll oldies, or unmelodic bebop-daddio-muzak jazz.

In such close proximity, I noticed several ways her manufacturing and packaging procedures required streamlining. I couldn't help mentioning them. "Show me how you'd do it," she said with admirable openness to criticism. "Empowered women don't get defensive," she once told me.

By the summer's end, I was fully familiar with her production methods and schedule. I even helped out for an hour or two while glue dried or my cordless drill charged. It was heavy work, but "You make it look so easy," Joy admitted.

This is what I mean by cunning and patience: In early autumn her chiropractor alleged that her lower back wouldn't permit her to do more than just seal and label the plastic jars, a job easily done on the kitchen table. I suggested an obvious solution.

Tonight, as snow falls and the radio, at full military volume, plays the Beach Boys' "Good Vibrations," I have my seven–project shop back. While waiting to add another strip to the canoe, I work on project #7—mixing the herbs and putting them in plastic jars. The fluorescent lights tremble a bit, but the ceiling joists are sturdy.

These are the fruits of finesse. Although the question still flickers through my brain: Who finessed whom? PW

Jeff Taylor *keeps his pen flowing in Blodgett, Oregon.*

"Wow, that's neat Grandpa. Now do a compound miter!"

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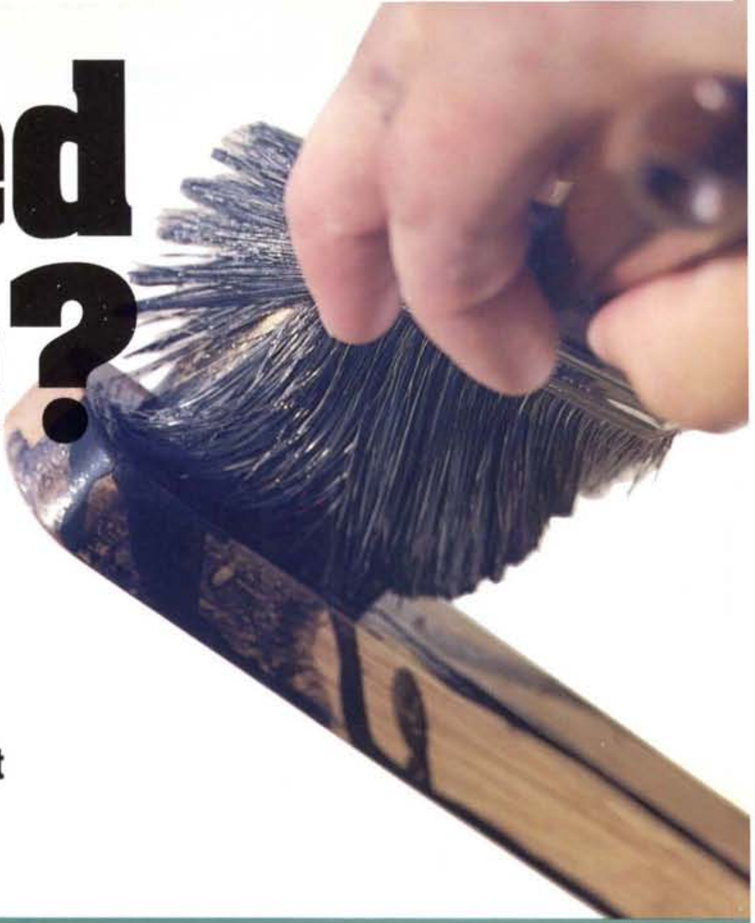

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Besides Evaluating Its Features,
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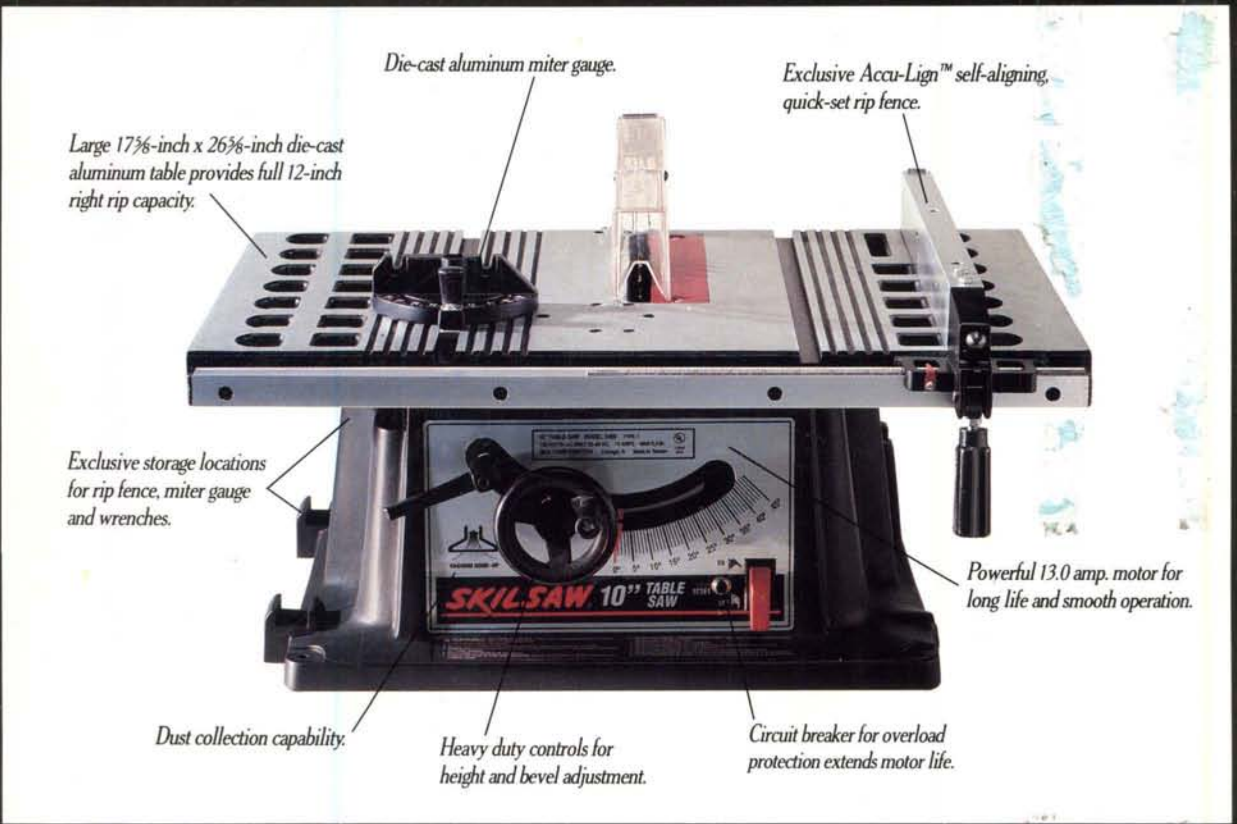

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